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British Museum (Natural History)  
A map showing the known  
distribution in England

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BRITISH MUSEUM (NATURAL HISTORY). Dept. of Ent.

CROMWELL ROAD, LONDON, S.W.

A MAP SHOWING THE KNOWN  
DISTRIBUTION IN ENGLAND AND  
WALES OF THE ANOPHELINE  
MOSQUITOES, WITH EXPLANA-  
TORY TEXT AND NOTES.

BY

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## PREFACE.

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THE Anopheline group of mosquitoes is made up of several distinct species, some found in one part of the world and some in another. It is the group to which all those particular species of mosquito belong which are known to act as carriers of malaria.

When one of these mosquitoes bites a malaria patient, it sucks in with the blood of the patient some of the parasitic organisms to whose presence in the blood the malaria is due; these parasites reproduce and multiply within the body of the mosquito, eventually make their way into its salivary glands, and thence can be injected into the blood of the next person bitten by the insect.

Three species of *Anopheles* are indigenous in Britain, two of which, namely *A. maculipennis* Meig. and *A. bifurcatus* L., are known to be malaria carriers. *A. maculipennis* is the species that is most active in the spread of malaria in Southern Europe.

The object of the present map, and of the text written to accompany it, is to show what is known of the distribution of those three species of Anopheline mosquitoes in England and Wales.

Such knowledge becomes of very great importance at the present time, owing to the fact that there are now a great many infected soldiers in this country who have been brought in from overseas, and who constitute a source from which malaria may be spread by the agency of the mosquitoes.

Mr. W. D. Lang, to whom the preparation of the map has been entrusted, has devoted much time to the work, and has endeavoured to do his best with the means within his reach. But it is obvious that no map of the kind could be made anything like complete or final, except after a prolonged and very careful search for the species over the entire area which it covers.

There are many parts shown blank on the map, where no such search has ever been undertaken, and where investigation is at the present time desirable. On the other hand, there are some large districts in which a great deal in that direction has already been accomplished, especially through the action of the medical authorities of the Local Government Board and of the War Office.

For the assistance thus obtained in making the map more complete, the thanks of the Trustees are due, as well as for the assistance received from various other sources acknowledged by Mr. Lang at page 6.

Here may be specially mentioned the valuable help which has been derived from the map and records published by Prof. G. H. F. Nuttall and others in the *Journal of Hygiene* for 1901. Prof. Nuttall's map has, in fact, served to a great extent as the model upon which the present one is based.

Although the map, for the reason stated, may not give an altogether true idea of the distribution of *Anopheles* in England and Wales, Mr. Lang has, I think, succeeded in making it give as complete and true an idea as the present state of knowledge on the subject will allow.

CHARLES J. GAHAN,

*Keeper of Entomology.*

BRITISH MUSEUM (NATURAL HISTORY),  
June, 1918.

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## A MAP OF ENGLAND AND WALES SHOWING THE LOCALITIES WHENCE ANOPHELES— THE MALARIA-BEARING GENUS OF MOS- QUITO—HAS BEEN OBTAINED.

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THE accompanying map shows in what parts of England and Wales mosquitoes of the genus *Anopheles* have up to now been found. But it should be noted that neither with regard to range, nor to the frequency of occurrence, is the true distribution directly shown on the map. As to its range, *Anopheles* is likely to be found in suitable stations all over England and Wales; and, as to its frequency, it is probably most abundant in the lower reaches of the larger rivers and in low-lying tracts of marshy ground. And, though the map may corroborate these two points, yet it more obviously shows the districts where *Anopheles* has been most keenly sought; and this point should be borne in mind before deductions are drawn from the map as to the distribution of *Anopheles*.

Localities where *Anopheles* has been obtained are indicated on the map by numbers surrounded with either a red ring, a blue V, a black triangle or a red rectangle. In many cases it has not been possible to determine the species of *Anopheles* recorded from a given locality, though it is more probable than not that the species is *A. maculipennis* Meigen, and the numbers indicating such localities are placed within a red rectangle; the majority of the numbers are surrounded by a red ring, and these mark the localities where *A. maculipennis* Meigen has been obtained; *A. bifurcatus* (Linnaeus) is recorded from the places whose numbers are enclosed in a blue V; while the occasional black triangles surround numbers indicating localities for *A. plumbeus* Stephens.

The numbers refer to the localities given in the following list. In this list the localities for *A. maculipennis* are taken first, and arranged alphabetically, primarily according to the counties in which they lie, and secondarily according to the place-names themselves; next, localities for *A. bifurcatus* are similarly dealt with; then those for *A. plumbeus*; and, finally, the localities for *Anopheles* of undetermined species. Besides the locality, the particulars of each record are given, and, in some cases, notes and general observations accompanying the records. The last are often of great interest, and make it possible to construct to some extent the life-history of the species concerned. For the sake of completeness Scotch and Irish records have been added in each case after those from Wales.

Following the list of localities are some practical notes on how to distinguish (a) a true Gnat (= Mosquito) from other flies; (b) a British Anopheline mosquito (that is, a British species of *Anopheles*, which genus alone conveys malaria) from a Culicine mosquito (that is, a non-malarial gnat); and (c) the three British species of *Anopheles*. There is also added a brief *résumé* of what is known of the life-history of each species.

The sources whence the information given in the text is drawn are comparatively few. Some of the records have already been published, and full reference to these publications is given, except in the frequent allusions

to (1) F. W. Theobald—A Monograph of the Culicidae or Mosquitoes, vol. i, 1901, and vol. v, 1910, and referred to as *T. 1901*, and *T. 1910*, respectively; (2) G. H. F. Nuttall, L. Cobbett and T. Strangeways-Pigg, Studies in Relation to Malaria, I, Journal of Hygiene, vol. i, 1901, pp. 1-44, and referred to as *N. 1901*; (3) G. H. F. Nuttall, note on the prevalence of *Anopheles*, Journal of Hygiene, vol. v., 1905, pp. 485-7, and referred to as *N. 1905*.

Other records, hitherto unpublished, have been obtained from the following sources :—

(1) Col. Sir Ronald Ross, F.R.S., through Capt. F. W. O'Connor, R.A.M.C., has kindly supplied information as to the distribution of *Anopheles* on both sides of the mouth of the Thames, from Sandwich and the neighbourhood of Romney Marshes. Such records obtained through the War Office are acknowledged in the text by the initials *W. O.*

(2) The Local Government Board has kindly co-operated in the production of the map, first by asking the Medical Officers of Health in the various districts to send to the Museum any mosquitoes they may collect. In this way many records have been obtained, and particularly from south-eastern Essex, in which district, owing to the energies of Dr. J. F. Macdonald, *Anopheles maculipennis* has been sent from approximately a hundred localities. Records obtained by this means are acknowledged in the text by the initials *L. G. B.*, placed after the record. Secondly, the Local Government Board, through their entomologist, Mr. A. J. Grove, have made available the records that he and others in their employ have obtained in the field. And I should like to take this opportunity of acknowledging the ever-ready help and courtesy of Mr. Grove and the trouble he has taken to supply the information in a readily available form. Such records have the initials *A. J. G.*, *L. G. B.*, placed after them.

(3) Mr. F. V. Theobald, M.A., has been kind enough to supply a manuscript map on which are marked localities from which *Anopheles* has been recorded, together with notes giving, in many cases, particulars of the records. This information is distinguished by the initials *T's. MS.*

(4) Mr. Hugh Scott, M.A., had gathered many records from various sources with a view to compiling the map himself. When the task devolved on me, he handed me these records, and I am much indebted to him for his help and advice in introducing me to the work. In addition, he has since sent me some of his own observations as well as the records of the British species of *Anopheles* in the collection in the Cambridge University Museum. His help is acknowledged by the initials *H. S.* following the information he has supplied.

(5) At the request of Mr. A. Vassall, M.A., of Harrow School (to whom I am thus indebted for information from this source), the Secretary of the Association of Public School Science Masters circularised the various Public Schools, asking them to send to the Museum localised specimens of gnats. Records obtained by this means are marked with the initials *P. S.*

(6) Particulars relating to specimens in the British Museum Collection have been noted.

(7) Various persons, learning through channels other than those indicated that localised specimens were needed, have sent such from time to time with particulars of their occurrence. The source of such records is given in each case, and a general acknowledgment of their help is here made.

The following abbreviations also are used :—

♂ = male. ♂ ♂ = males.  
 ♀ = female. ♀ ♀ = females.  
 coll'd. = collected by.  
 colln. = collection.



det. = determined by.

det. conf. = determination confirmed by.

inf. = information received from.

obs. = observed by.

per. = by means of.

rec. = received.

Unless otherwise stated, the record refers to the imago, or fly; the earlier stages are always referred to either as larvae or pupae as the case may be.

## ANOPHELES MACULIPENNIS Meigen.

Numbers on the map referring to this species are within red circles.

### BEDFORDSHIRE.

1. **Bedford.** (1) On road from Sandy, 3 m. from Bedford, at 100 ft. or less; larvae in a small stream; (2) in R. Ouse at Bedford, along town promenade; in patches of algae; a few small larvae; both, 4, viii, 1900; obs. W. Mitchell. *N. 1901.* (3) *T's. MS.*
2. **Biggleswade.** Common, 1889-1892. *T's. MS.*
3. **Caldecote,** N.W. of Biggleswade. Common. *T's. MS.*
4. **Luton.** *T's. MS.*
5. **Sandy.** (1) On road to Biggleswade, at 100 ft. or less; in a ditch fed through an overflow from a small stream in which *Anopheles* was plentiful, but *Culex* absent; a few small larvae with many *Culex*-larvae; 4, viii, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*

### BERKSHIRE.

6. **Abingdon.** 1 ♀; rec. 15, x, 1917; colld. R. H. Birt; det. W. D. L. P. S.
7. **Day's Lock,** Little Wittenham, N.W. of Wallingford. (1) At about 130 ft.; larvae plentiful in water-logged punt in weir-stream; 14, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
8. **Hambleton Lock,** N.E. of Henley-on-Thames, Oxon. At 100 ft. or less; larvae fairly numerous among floating debris and weed, just below the lock, and on the Berks. side of the open river; 17, ix, 1900; obs. L. Cobbett. *N. 1901.*
9. **Reading.** *T's. MS.*
10. **Streatley,** W. of Goring, Oxon. At 110 ft.; a few larvae in over-shadowed ditch on mill-island, fed by river-water at flood times only; none found in backwaters, in spite of a long search; 17, ix, 1900; obs. L. Cobbett. *N. 1901.*
11. **Wargrave-on-Thames,** S. of Henley-on-Thames, Oxon. In several consecutive years swarming in a patch of willow-herb; colld. J. D. Copland. *British Museum Collection.*
12. **Windsor.** *T's. MS.*

### BUCKINGHAMSHIRE.

13. **Bletchley.** (1) At about 200-300 ft.; imago reared from larvae found in a little grassy-margined lake containing small fishes, swans and ducks; 18, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*

14. **High Wycombe.** 1 ♀ rec. alive, 24, x, 1917; coll'd. Miss H. M. Lang; det. W. D. L.
15. **Linslade,** N.W. of Leighton Buzzard, Beds.; 1 ♀, rec. 23, i, 1918; coll'd. Dr. Cowper; det. W. D. L. *L. G. B.*
- 15a. **Long Crendon,** N. of Thame, Oxon. In rooms above ground; 1 ♀, with ♀♀ *Culex pipiens* ("thousands in the cellar"—many ♀♀ *Culex pipiens* from the cellar also sent, but no *A. maculipennis* among these); rec. 26, ii, 1918; coll'd. S. S. Buckman; det. W. D. L.

## CAMBRIDGESHIRE.

16. **Burwell,** N.W. of Newmarket, Suffolk. ♀♀; ix, 1898. *T's. MS.*
17. **Cambridge.** (1) At 50 ft. or less; (a) five larvae caught in company with small fishes, tadpoles, *Asellus*, etc., in a shallow ditch in Grantchester Meadow near the University Bathing-house; (a week later there were no larvae there, and they did not reappear); 10, v, 1900; obs. E. Bles; (b) 150 larvae caught on 29, vi, 1900, and 191 on 19, vii, 1900, in a shallow ditch leading to mill-pit on Sheep's Green, with algae and fishes; (in viii the ditch was dry); obs. G. H. F. Nuttall; (c) 1 ♂ in out-house, Pathological Laboratory; 7, vii, 1900; obs. G. H. F. Nuttall; (d) 3 ♀♀ in two private houses in Adams and Cranmer Roads; ix and x, 1900; obs. G. H. F. Nuttall; (e) 2 larvae in R. Granta, near Newnham, 20, x, 1900; obs. W. Mitchell. *N. 1901.*
- (2) Imago from ii-vi, 1889-1894; obs. Theobald. *N. 1901.*
- (3) Cambridge-Ely railway; at about 50 ft. or less; 22 larvae in pools near railroad, just N. of R. Cam; 19, vii, 1900; obs. W. Mitchell. *N. 1901.*
- (4) Cambridge-Histon road; at 50 ft. or less; 5 larvae and 1 pupa, with *Chironomus*-larvae in a small pond of impure water, bordered with grass and rushes, near the road,  $\frac{3}{4}$  m. from the corner of the Huntingdon road; 24, vi, 1900; obs. G. H. F. Nuttall. *N. 1901.*
- (5) ♀♀ on many occasions. *T's. MS.*
- (6) Records from Cambridge in the Cambridge University Museum Colln.; (a) ♀; iii, 1893; (b) ♂; 1, vii, 1912; 2 ♂♂; 31, vii, 1912; ♀; 7, xi, 1910; coll'd. Hugh Scott; (c) ♀; in house; 4, viii, 1904; ♀; ix, 1900; coll'd. F. J. H. Jenkinson; all dets. conf. F. W. Edwards. *H. S.*
- (7) Occurs so frequently that special records are not usually kept; often enters houses in autumn (e.g. several ♀♀ in my house, 15-16, ix, 1917, and 1 ♀, 23, ix, 1917); Mr. F. J. H. Jenkinson, M.A., who gets all the three species of *Anopheles* in his house and garden, states that it occurs in the house abundantly, but does not bite very much (cf. *A. bifurcatus*). During the season of 1916 he took about 100 in the house, and there were sometimes as many as twelve in his bedroom in the morning. *H. S.*
- (8) There has been a notable decrease in the number of imagines in cellars, etc., in the winter months. The insects were fairly numerous in my house during 1901-2, as many as 60-100 hibernating in the cellar. In 1903-4 there were fewer, about six only being caught. Not a single imago has been caught in the house since that winter. Whereas *Anopheles* was frequently caught in houses during the winter months of 1901-3, very few were encountered in 1904, and I have not found a single specimen this year. The common *Anopheles* in this region is *A. maculipennis*, *A. bifurcatus* being less frequently encountered. Apparently, corresponding results have to be recorded with regard to *Anopheles*-larvae. These



were certainly very numerous during the period 1900-1903, and they have become scarcer since, being, apparently, absent in certain waters where they abounded. That *Anopheles* is not extinguished is certain, for I have found a few larvae of *A. maculipennis* in the Cam this summer, and my friend Mr. Pearce has brought me an imago from Grantchester, in addition to larvae of *A. bifurcatus* which must have hibernated there. Hibernating larvae of this species have twice been found by me since I first recorded their presence at Cambridge. Of course, this is but an isolated observation, and necessarily it can have but limited value. It is known of other insects that they are more numerous in some years than in others. It is possible that the reduction in the number of *Anopheles* in these parts has been due to the repeated and sudden rainfalls during the last three summers; personally, I am strongly inclined to the opinion that these rainfalls have exerted an influence. They would occasionally wash away the larvae in large numbers from the situations which they normally inhabit. It is dangerous to argue from an isolated instance, but, knowing that ague formerly prevailed in these parts, an explanation of its disappearance may possibly be found in the reduction of *Anopheles* persisting for a sufficient length of time to break the chain of parasitism of the malarial parasites in man and the mosquito. *N. 1905.*

- (9) In a house; none seen during week-end, 16-17, iii, 1918; but a number awoke during the ensuing week, and were about during the week-end 23-24, iii, 1918; several ♀♀ captured in rooms on ground floor and first floor, some of these having evident intent to bite, e.g., one on ground floor at about 3.30 p.m. (true time), on 24, iii, 1918. *H. S.*
18. **Ely.** (1) At 50 ft. or less; 212 larvae from a long ditch east of and close to the railway station, and on the road to Newmarket; the water at midday was 24° C., it was slowly running, peaty-tinted, 1 ft. deep, and contained green algae, *Asellus* (plentiful), but no fishes; 14, vii, 1900; obs. G. H. F. Nuttall. *N. 1901.* (2) *T's. MS.*
  19. **Foxton**, S.W. of Cambridge. *T's. MS.*
  20. **Girton**, N.W. of Cambridge. (1) At 50 ft. or less; two small larvae and two *Culex*-larvae in stagnant, muddy ditch, with water 2 in. deep, with no green algae, crossed by a bridge  $\frac{3}{4}$  m. from Cambridge on the Via Devana near Girton; 2, vii, 1900; obs. G. H. F. Nuttall. *N. 1901.* (2) *T's. MS.*
  21. **Grantchester**, S.W. of Cambridge. At 50-100 ft.; imago in house; iv, 1905; obs. N. D. F. Pearce; det. G. H. F. Nuttall; (see also under 17 Cambridge, record 8). *N. 1905.*
  22. **Great Shelford**, S. of Cambridge. 1 ♀, 1899. *T's. MS.*
  23. **Histon**, N. of Cambridge. 2 ♀♀, 1899. *T's. MS.*
  24. **Littleport**, N. of Ely. (1) At 50 ft. or less; 91 larvae from a small roadside ditch filled with much yellowish-green dead weed and algae; water at 24° C.; 14, vii, 1900; obs. G. H. F. Nuttall. *N. 1901.* (2) *T's. MS.*
  25. **March**. (1) At 50 ft. or less; (a) a few larvae, with many *Culex*-larvae in shallow pools along an almost dried ditch on the high-road to Wisbech; (b) numerous larvae in a ditch where the road turns N. to Wisbech; (c) larvae in ditches all along the road to Sutton; 21, vii, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*
  26. **Swaffham**, N.E. of Cambridge. *T's. MS.*
  27. **Upware**, N.E. of Cambridge. 11, vii; obs. J. E. Collin. *H. S.*

28. **Waterbeach**, N.E. of Cambridge. (1) At 50 ft. or less; (a) 53 larvae from a ditch; 6, vii, 1900; obs. W. Mitchell; (b) a fair number of larvae in a ditch near railway-crossing; 22, viii, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
29. **Wicken Fen**, N.E. of Cambridge. At 50 ft. or less; 11-19, vii; coll'd. Verrall. *N. 1901.*
30. **Wisbech.** *T's. MS.*
31. **Whittlesea.** *T's. MS.*

## CHESHIRE.

*Note on specimens hibernating in farms.* A. E. Annett and J. Everett Dutton, 1901, *British Medical Journal*, vol. i, p. 1013. On 7, ii, during very cold weather, four specimens of *A. maculipennis* (det. F. V. Theobald), with four specimens of *Culex*, were caught at a farm in Cheshire, 13 m. from Liverpool. Thousands of mosquitoes, principally *Culex*, blackened walls and rafters in damp and disused cellars, and others in rooms. Later, between 17, ii, and 27, iv, *A. maculipennis* was collected from four other farms in northern and mid-Cheshire, one being 35 m. from Liverpool; about 20 *Anopheles* being taken from each farm. There are further notes on characteristic altitudes and positions, e.g., *Anopheles* generally being near the ceiling and *Culex* on the walls near the ground. *H. S.*

32. **Bruera**, S.E. of Chester
33. **Christleton**, E. of Chester
34. **Hatton Heath**, S.E. of Chester
35. **Rowton**, S.E. of Chester, and vicinity, namely, 32 Bruera, 33 Christleton, 34 Hatton Heath, 36 Saighton, 37 Stanford Bridge, 38 Tarvin, and 39 Waverton. All from 50-100 ft.; larvae were found in one ditch, one dried stream, and nine ponds; of sixteen other places tried, without result, were seven *Lemma*-covered ponds, one pond swarming with tadpoles, four ponds very thickly weed-covered and one very dirty pond; larvae were found plentifully with *Culex*-larvae in two ponds, and with fishes in three ponds; 2 imagines were taken indoors at Rowton Hall; no cases of locally-acquired ague admitted to Chester infirmary since 1891; no access to older records; 21-28, vi, 1901; obs. J. W. S. Macfie; det. G. H. F. Nuttall. *N. 1905.*
36. **Saighton**, S.E. of Chester
37. **Stanford Bridge**, E. of Chester
38. **Tarvin**, E. of Chester
39. **Waverton**, S.E. of Chester

## CORNWALL.

40. **Bude.** *T's. MS.*
41. **Fowey.** viii, 1909. *T's. MS.*
42. **Looe.** 2 ♀ ♀; viii and ix, 1909. *T's. MS.*
43. **Mullion.** 1 ♀; viii, 1911; coll'd. Dr. G. A. K. Marshall. *British Museum Collection.*
44. **Polperro**, E. of Looe. 1 ♀; viii, 1909. *T's. MS.*
45. **Truro.** 2 ♀ ♀; vii and viii, 1909. *T's. MS.*

## CUMBERLAND.

46. **Carlisle.** Several ♀ ♀ and 1 ♂; 10, ix, 1909. *T's. MS.*



DERBYSHIRE.

47. **Bakewell.** In hotel; ix, 1881. *T's. MS.*
48. **Buxton.** In and near town; ♀ ♀; viii and ix, 1884 and 1887. *T's. MS.*
49. **Derby.** Near the town; ♀ ♀ plentiful; 1900. *T's. MS.*

DEVONSHIRE.

50. **Barnstaple.** *T's. MS.*
51. **Budleigh Salterton,** E. of Exmouth. Common; i and ix, 1889 and 1894. *T's. MS.*
52. **Cornwood,** N.E. of Plymouth. (1) 1, ix; inf. J. E. Collin. *H. S.* (2) At 300-400 ft.; 1, ix; colld. Verrall. *N. 1901.* (3) *T's. MS.*
53. **Dart River.** At several places along the Dart. *T's. MS.*
54. **Dawlish.** *T's. MS.*
55. **Idc** (spelled "Eide" on Theobald's map), S.W. of Exeter. *T's. MS.*
56. **Exeter.** (1) At 50-100 ft.; a very few larvae in R. Exe, near St. David's station; 5, ix, 1900; obs. T. Strangeways-Pigg. *N. 1901.* (2) *T's. MS.*
57. **Exmouth.** 1 ♀ (no date) and a few in 1889. *T's. MS.*
58. **Falla Pit,** N.E. of Kingsbridge. vii, 1906. *T's. MS.*
59. **Kingsbridge.** 2 ♀ ♀ in town; vii, 1906. *T's. MS.*
60. **Lynmouth.** *T's. MS.*
61. **Okehampton.** 6, vii, 1904. *T's. MS.*
62. **Plymouth.** ix, 1881; and viii, 1908. *T's. MS.*
63. **Sidmouth.** 1 ♀; i, 1901. *T's. MS.*
64. **Teignmouth.** (1) At 100 ft. or less; 2, vi, 1884; colld. Theobald. *N. 1901.* (2) *T's. MS.*
65. **Tiverton.** vii, 1904. *T's. MS.*
66. **Torquay.** (1) On several occasions in autumn; also 2 ♀ ♀ in house. xi, 1884; (2) at Mary Church, Torquay; 1 ♀; iii, 1888. *T's. MS.*
67. **Totnes.** On many occasions. *T's. MS.*

DORSETSHIRE.

68. **Corfe.** *T's. MS.*
69. **Creekmore,** N.W. of Poole. (1) At 50-100 ft.; very many larvae in boggy situations; 1, ix, 1900; obs. T. Strangeways-Pigg. *N. 1901.* (2) *T's. MS.*
70. **Netherbury,** S.W. of Beaminster. (1) At 100-200 ft.; larvae; obs. Prof. Lefroy; det. Prof. L. C. Miall. *N. 1901.* (2) *T's. MS.*
71. **Poole.** (1) *T's. MS.* (2) Poole district; obs. W. Parkinson Curtis: per N. M. Richardson. *A. J. G. L. G. B.*
72. **Shaftesbury.** Specimens sent by Mason, 1912. *T's. MS.*
73. **Swanage.** *T's. MS.*
74. **Tolpiddle,** N.E. of Dorchester. (1) At 50-100 ft.; larvae fairly numerous, with *Culex*-larvae in farm-yard pond with clouded water and no drainage into it; 1, ix, 1900; obs. T. Strangeways-Pigg. *N. 1901.* (2) *T's. MS.*
75. **Wimborne.** viii, 1914. *T's. MS.*

## ESSEX.

76. **Althorne**, N.E. of Rochford. Numerous at Althorne Farm; 7 ♀♀ rec. 22, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
77. **Asheldham**, S.E. of Maldon. Numerous at Asheldham Hall; 9 ♀♀ rec. 21, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
- [137]. **Ashingdon**, N. of Rochford. Moon's Farm; 3 ♀♀ rec. 28, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
78. **Barling**, E. of Rochford. In stable, with *Culex pipiens*; 2 ♀♀ rec. 1, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
79. **Boreham**, N.E. of Chelmsford. Old Hall; 2 ♀♀ rec. 17, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
80. **Bottle End**, S.W. of Colchester. (1) At 200 ft. or less; on road to Maldon; a few small larvae in pond; 2, ix, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*
81. **Bradwell**, E. of Maldon. Numerous at Curry Farm; 9 ♀♀ rec. 21, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
82. **Brentwood**. *T's. MS.*
83. **Broomfield**, N. of Chelmsford. Patchinghall Farm; 1 ♀ rec. 13, x, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
84. **Bulvan** (also spelled "Bulphan"), N. of Tilbury. (1) At 50 ft. or less; imago raised from many larvae found in a ditch in fen-land; 18, ix, 1900; obs. T. Strangeways-Pigg. *N. 1901.* (2) *T's. MS.*
85. **Buttsbury**, S.W. of Chelmsford. In a farm-house; 5 ♀♀ rec. 8, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
86. **Canewdon**, N.E. of Rochford. Little Doggett Farm; 6 ♀♀ rec. 28, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
87. **Canvey Island**. *T's. MS.*
88. **Chelmsford**. [See also, under this number, **Great Baddow**, **Sandon**, **Springfield**, **Widford** and **Writtle**.] (1) In house; 3 ♀♀ rec. 9, x, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.* (2) *T's. MS.*
89. **Chignal**, N.W. of Chelmsford. Abundant at Briton's Hall; 7 ♀♀ rec. 12, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
- [155]. **Coal House**. See under Tilbury (3).
90. **Colchester**. 1 ♀; ii, 1890. *T's. MS.*
- [152]. **Cold Norton**, N.E. of Stow St. Mary's, S. of Maldon. Cold Norton Hall; 5 ♀♀, with *Culex pipiens*, rec. 21, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
91. **Corringham**, N.E. of Tilbury. (1) At 50 ft. or less; many larvae in ditches with brackish water, about  $\frac{1}{2}$  m. from the church; 18, ix, 1900; obs. T. Strangeways-Pigg. *N. 1901.* (2) *T's. MS.*
92. **Cricksea**, S.E. of Maldon. Numerous at Elm Farm; 4 ♀♀ rec. 21, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
93. **Crouch River**. *T's. MS.*
94. **Danbury**, S.E. of Chelmsford. Small farm, Russell Green; 2 ♀♀, with *Culex pipiens*, rec. 6, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
95. **Dengie**, S.E. of Maldon. Numerous at Dengie Hall; 6 ♀♀, with *Culex pipiens* and *Theobaldia annulata*, rec. 21, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
96. **East Hanningfield**, S.E. of Chelmsford. 7 ♀♀, with *Theobaldia annulata*, rec. 1, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*



97. **Eastwood**, S.W. of Rochford. 1 ♀, with *Culex pipiens*, rec. 12, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
98. **Epping**. T's. MS.
99. **Epping Forest**. [See also, under this number, **Loughton**.] Col. A. Alcock is accustomed to get specimens for laboratory purposes from this locality (letter, 20, v, 1917). *H. S.*
- [155]. **Fort Victoria**. See under Tilbury (3).
100. **Foulness Island**. (1) 1 ♀, rec. 20, xi, 1917; (2) 1 ♀, with *Theobaldia annulata*, rec. 28, xi, 1917; (3) from a stable "they are swarming in this stable"; 15 ♀♀ rec. 4, xii, 1917; all coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
101. **Good Easter**, N.W. of Chelmsford. G. Matthew's Farm: 1 ♀ rec. 4, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
- [155]. **Gray's Thurrock**. (a) 3 specimens in six houses visited; 19-20, ix, 1917; (b) larvae sheltering among abundant *Spirogyra* in the clear water of a permanent fairly deep pool with swampy margins overgrown in places with tall grass, and containing, apparently, numerous small fishes; there were houses within 100 yards, no trees near, and cattle in small numbers close by; 19, ix, 1917; temperature of air, 63°; weather wet and stormy; (c) mostly small larvae and more pupae than larvae in clear water, with not much weed, of various drainage-ditches on marsh, containing numerous water-scorpions, but, apparently, but few small fishes; 20, ix, 1917; temperature of air, 65°; bright sunshine; all obs. Mrs. A. Macdonald. *A. J. G. L. G. B.*
- [88]. **Great Baddow**, S.E. of Chelmsford. Great Baddow Hall: 1 ♀, with *Culex pipiens*, rec. 28, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
102. **Great Braxted**, N. of Maldon. West Hall Farm: 2 ♀♀, with *Culex pipiens*, rec. 14, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
103. **Great Clacton**. 1 ♀, rec. 11, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
104. **Great Leighs**, N. of Chelmsford. From a farm; 3 ♀♀, with *Theobaldia annulata*, rec. 11, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
- [137]. **Great Stambridge**, E. of Rochford. W. Barker's stable: 6 ♀♀, rec. 26, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
105. **Great Wakering**, S.E. of Rochford. (1) From a stable in High Street; 4 ♀♀, rec. 1, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.* (2, a) In a house on a road on the marshes; front room, 5, with 8 Culicines; kitchen, 1, with 2 Culicines; 12.0 noon; (b) a coastguard cottage; front room, 3, with 4 Culicines; kitchen, none; 2.0 p.m.; (c) an inn; two rooms, one with 2 *Anopheles* and 2 Culicines, and the other with 2 *Anopheles* and 1 Culicine; 4.30 p.m.; (d) a cottage in the village; kitchen, 2, with 3 Culicines; bedroom, 2; 5.0 p.m.; (e) a cottage in the village; front room, 1, with 5 Culicines; (f) a cottage in the village; front room, 3, with 4 Culicines; bedroom, none, but 2 Culicines; 5.30 p.m.; (g) larvae, with no other larvae or fishes, in the muddy water containing some duckweed in hoof-marks and pools of permanent marshy ground; cattle in meadows, and houses within  $\frac{1}{4}$  m.; (h) larvae, with some small fishes and plentiful duckweed, in clear water of ditches leading from a pond; cattle in meadows, and houses within  $\frac{1}{4}$  m.; all on 24, ix, 1917; bright sunshine; obs. Mrs. A. Macdonald. *A. J. G. L. G. B.*

106. **Great Waltham**, N. of Chelmsford. From Ford End; 1 ♀, with *Culex pipiens*, rec. 17, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
107. **Hadleigh**, S.W. of Rochford. In a stable attached to butcher's shop, High Street; 21 ♀♀, with *Culex pipiens*, rec. 6, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
108. **Hatfield Heath**, N. of Epping. See under 126 Matching Green.
109. **Havengore Island**. From a stable; 7 ♀♀, rec. 1, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
- [137]. **Hawkwell Hall**, N.W. of Rochford. 3 ♀♀, rec. 1, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
- [168]. **Hazeleigh**, S. of Maldon. Hazeleigh Farm; 2 ♀♀, with *Culex pipiens*, rec. 27, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
110. **Heybridge**, N. of Maldon. (1) At 50 ft. or less; larvae plentiful in ditch with brackish water; 2, ix, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.* (3) (a) Fever Hospital; 1 ♀, rec. 11, x, 1917; (b) The Towers; 1 ♀, rec. 19, x, 1917; both coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
111. **Hockley**, N.W. of Rochford. Bull Farm; 14 ♀♀, rec. 28, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
112. **Hornchurch**, S.E. of Romford. [Entered in Theobald's *MS.* Map as "Horncastle."] *T's. MS.*
113. **Ingatestone**, N.E. of Brentwood. Abundant in an empty cottage; 4 ♀♀, with *Theobaldia annulata*, rec. 26, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
114. **Langford**, N. of Maldon. Cow-shed belonging to Mr. Chalk; 1 ♀, with *Culex pipiens*, rec. 17, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
115. **Latchingdon**, S.E. of Maldon. Numerous at Aleham Farm; 6 ♀♀, rec. 22, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
116. **Lexden**, W. of Colchester. (1) At 100 ft. or less; a very few small larvae in a stream; 2, ix, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*
117. **Little Baddow**, E. of Chelmsford. Cuckoo Farm; 1 ♀, rec. 28, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
118. **Little Braxted**, N. of Maldon. Hall Farm; 4 ♀♀, with *Culex pipiens*, rec. 14, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
119. **Little Leighs**, N. of Chelmsford. Priory Farm; 4 ♀♀, with *Culex pipiens*, rec. 23, x, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
- [137]. **Little Stambridge**, N.E. of Rochford. J. Stank's pig-sty, Cherry Tree Inn; 3 ♀♀, rec. 26, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
120. **Little Totham**, N.E. of Maldon. Very abundant at Chapel Farm; 17 ♀♀, rec. 17, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
121. **Little Wakering**, S.E. of Rochford. From a stable; 6 ♀♀, with *Culex pipiens*, rec. 1, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
122. **Little Waltham**, N. of Chelmsford. 3 ♀♀, with *Theobaldia annulata*, rec. 28, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
123. **London, Albert Dock**. (1) ♀, ix, 1909; larvae, 1901; *T's. MS.* (2) Col. A. Alcock has found *A. maculipennis* in the Animal House



- of the London School of Tropical Medicine (letter, 20, v, 1917). He does not state whether he considers that it was *originally* introduced there as material for laboratory purposes or not. *H. S.*
- [99]. **Loughton** district. Not in any considerable numbers: 1 in bedroom, autumn, 1917; obs. G. Bacot. *A. J. G. L. G. B.*
124. **Margaretting**, S.W. of Chelmsford. From a farm; 2 ♀♀, rec. 11, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
125. **Mashbury**, N.W. of Chelmsford. 1 ♀, rec. 13, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
126. **Matching Green and Hatfield Heath**, N. of Epping. (1) At 200–300 ft.; larvae fairly numerous in a roadside ditch; 18, ix, 1900; obs. T. Strangeways-Pigg. *N. 1901.* (2) *T's. MS.*
127. **Mayland**, S.E. of Maldon. Numerous at Uplands; 5 ♀♀, with *Culex pipiens*, rec. 21, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
128. **Mundon**, S.E. of Maldon. Kop Kitchen's Farm; 4 ♀♀, rec. 27, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
129. **Newport**, S. of Saffron Walden. *T's. MS.*
- [152]. **North Fambridge**, S. of Stow St. Marys. S. of Maldon. Numerous at The Rookery; 5 ♀♀, with *Culex pipiens*, rec. 22, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
130. **Ockenden**, S.E. of Romford. *T's. MS.*
131. **Ongar**, E. of Epping. (1) Near Ongar, on road to Brentwood; at 200–300 ft.; larvae fairly numerous in a pond; 18, ix, 1900; obs. T. Strangeways-Pigg. *N. 1901.* (2) *T's. MS.*
132. **Paglesham**, N.E. of Rochford. West Hall; 2 ♀♀, rec. 28, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
133. **Pitsea**, N.E. of Tilbury. (1) At 50 ft. or less; larvae plentiful in a ditch and pond; 3, ix, 1900; obs. W. Mitchell; also 18, ix, 1900; obs. T. Strangeways-Pigg. *N. 1901.* (2) *T's. MS.* (3) See under 155 Tilbury (3).
134. **Pleshey**, N.W. of Chelmsford. 4 ♀♀, with *Culex pipiens* and *Theobaldia annulata*, rec. 13, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
- [152]. **Purleigh**, S. of Maldon. (1) Numerous at Wild Farm; 4 ♀♀; (2) numerous at Marsh Farm; 5 ♀♀, with *Culex pipiens*; both rec. 22, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
135. **Rawreth**, N.W. of Rochford. Shotgate Farm; 8 ♀♀, rec. 28, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
136. **Rayleigh**, W. of Rochford. (1) A. Upson's stable, the Weir; 5 ♀♀, rec. 26, xi, 1917; (2) Thorn, ironmonger, High St.; 1 ♀, with *Culex pipiens*, rec. 21, xi, 1917; both coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
137. **Rochford**. [See also **Ashingdon**, **Great Stambridge**, **Hawkwell**, **Little Stambridge**, and **South Fambridge**.] (1) Hornsby stable, next to Workhouse Infirmary; fairly numerous; 7 ♀♀, rec. 9, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.* (2) Rochford and near R. Crouch; at 50 ft. or less; larvae fairly numerous in the stream—the Cam, and small larvae plentiful in a brackish pool; 2, xi, 1900; obs. W. Mitchell. *N. 1901.* (3) *T's. MS.*
138. **Romford**. ♀; ix, 1909. *T's. MS.*
139. **Roxwell**, N.W. of Chelmsford. (1) In empty cottage; 4 ♀♀, rec. 4, xii, 1917; (2) Jacobsen's Farm; 1 ♀, rec. 17, xi, 1917; (3) Thatcher's Farm; 1 ♀, with *Culex pipiens*, rec. 12, xi, 1917; all coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*

140. **Runwell**, N.W. of Rochford. In a farm-building; 2 ♀ ♀, rec. 8, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
141. **Rye House**, W. of Colchester. *T's. MS.*
142. **Saffron Walden**. *T's. MS.*
143. **St. Lawrence**, S.E. of Maldon. 10 ♀ ♀, rec. 22, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
- [88]. **Sandon**, S.E. of Chelmsford. 1 ♀, rec. 28, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
144. **Shoebury**. Shoebury House; 6 ♀ ♀, rec. 1, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
145. **Shopland**, S.E. of Rochford. From a cow-shed, Butler's Farm; 6 ♀ ♀, rec. 15, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
146. **South Benfleet**, S.W. of Rochford. Very numerous at the village bakery; 10 ♀ ♀, with *Theobaldia annulata*, rec. 6, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
147. **Southend**. *T's. MS.*
- [137]. **South Fambridge**, N. of Rochford. New Hall; 2 ♀ ♀, rec. 28, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
148. **South Hanningfield**, S. of Chelmsford. In a stable; 3 ♀ ♀, rec. 8, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
149. **Southminster**, S.E. of Maldon. 1 ♀, rec. 17, x, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
- [88]. **Springfield**, N.E. of Chelmsford. Marsh Farm; 1 ♀, with *Culex pipiens*, rec. 17, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
150. **Steeple**, S.E. of Maldon. Numerous at Foxhall Farm; 1 ♀, rec. 21, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
151. **Stock**, N.E. of Brentwood. In a cellar; 1 ♀, with *Theobaldia annulata*, rec. 8, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
152. **Stow St. Mary's**, S. of Maldon. [See also **Cold Norton**, **North Fambridge**, **Purleigh**, and **Woodham Ferris**.] Numerous at Great Harp; 13 ♀ ♀, rec. 21, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
153. **Sutton**, S.E. of Rochford. From a cow-shed, Fleet Hall Farm; 5 ♀ ♀, rec. 15, xii, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
- [155.] **Thames Haven**. See under Tilbury (3).
154. **Thundersley**, S.W. of Rochford. Thorrington's stable, White Hart Road; 7 ♀ ♀, rec. 26, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
155. **Tilbury**. (1) ix, 1901. *T's. MS.* (2a) Montreal Road; (i) front room, 4, with 3 *Culex*; back room, 3, with 5 *Culex*; scullery, 2, with 1 *Culex*; (ii) passage, 2; front room, 1; back room, 3, with 2 *Culex*; (iii) front room, 1; passage, 2; back room, 2, with 2 *Culex*; all at 4-5 p.m.; 13, ix, 1917; dull, cloudy weather; (2b) Council Estate, Avenue Crescent and Park View Avenue; (i) bedroom 1, 1, with 5 *Culicines*; bedroom 2, 1, with 1 *Culicine*; bedroom 3, 2, with 3 *Culicines*; (ii) scullery, 2, with 1 *Culicine*; bedroom 1, 2, with 6 *Culicines*; bedroom 2, 1, with 3 *Culicines*; bedroom 3, 1, with 2 *Culicines*; (iii) bedroom 1, 1, with 3 *Culicines*; bedroom 2, 2, with 2 *Culicines*; bedroom 3, 2, with 1 *Culicine*; all at 3-4 p.m.; 13, ix, 1917; dull, cloudy weather; (2c) a house in Broadway; bedroom 1,



- 1, with 3 Culicines; bedroom 2, 2, with 2 Culicines; bedroom 3, 0, with 2 Culicines; 3-4 p.m.; 13, ix, 1917; dull, cloudy weather; (2d) larvae in clear, very shallow water with grass growing in it and small fishes present (in deeper water), in permanent marshy ground; 12, ix, 1917; cattle near; bright, sunshiny weather; (2e) larvae in a ditch of permanent, stagnant water, dirty in places, with some duckweed and *Spirogyra*, but no fishes; 12, ix, 1917; bright, sunshiny weather; (2f) larvae in several ditches in neighbourhood of Council Estate and adjoining streets; water foul in places (a dead chicken lying in one pool), shallow, with marshy spots here and there, and water hidden by tall grasses in other parts; small fishes in the pools; houses within 30 yards; no cattle; 13, ix, 1917; weather dull and cloudy; (2g) larvae in dirty water of several ditches on the marsh between the houses and R. Thames; one ditch had many old tin cans and other rubbish; some small fishes in deeper parts; 13, ix, 1917; weather dull and cloudy; all coll'd. Mrs. A. Macdonald. *A. J. G. L. G. B.* (3) Tilbury district (includes **Coal House, Thames Haven, Pitsea and Fort Victoria**). Numerous, especially at Tilbury; larvae also numerous; iii, 1918. *W. O.*
156. **Tillingham**, S.E. of Maldon. Hedding's Farm; 2 ♀♀, rec. 21, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
157. **Tollesbury**, N.E. of Maldon. High Street; 11 ♀♀, rec. 7, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
158. **Tolleshunt d'Arcy**, N.E. of Maldon. (1) 1 ♀, rec. 7, xi, 1917; (2) from the Rectory; 1 ♀, with *Theobaldia annulata* and *Culex pipiens*, rec. 9, x, 1917; both coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
159. **Tolleshunt Knights**, N.E. of Maldon. From Four Chimneys; 1 ♀, with *Culex pipiens*, rec. 17, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
160. **Tolleshunt Major**, N.E. of Maldon. Brook House; 4 ♀♀, with *Culex pipiens*, rec. 14, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
161. **Uting**, N.W. of Maldon. French Croneham's Farm; 3 ♀♀, with *Culex pipiens*, rec. 17, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
162. **Waltham Abbey**. i and ix, 1882 and 1884. *T's MS.*
163. **West Hanningfield**, S. of Chelmsford. 1 ♀, rec. 10, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
164. **West Mersea**. 1 ♂; 6, ix, 1909; coll'd. W. Wesche. *British Museum Collection.*
165. **West Tilbury**. At 50 ft. or less; a very few larvae in a ditch; 3, ix, 1900; obs. W. Mitchell. *N. 1901.*
166. **Wickham Bishop**, N.W. of Maldon. Brackley Farm; 1 ♀, with *Culex pipiens*, rec. 14, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
167. **Waddington**, S. of Saffron Walden. viii, 1910. *T's MS.*
- [88]. **Widford**, S.W. of Chelmsford. Shed in churchyard; 2 ♀♀, rec. 26, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
- [152]. **Woodham Ferris**, W. of Stow St. Mary's, S. of Maldon. Myrtle Farm; 4 ♀♀, rec. 17, x, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
168. **Woodham Mortimer** [see also **Hazeleigh**], S.W. of Maldon. Woodham Mortimer Place; 2 ♀♀, with *Culex pipiens*, rec. 27, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*

169. **Woodham Walter**, W. of Maldon. (1) Gun Hill Farm; 1 ♀, with *Culex pipiens*, rec. 17, xi, 1917; (2) Oak Farm; 2 ♀ ♀, rec. 27, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*
- [88]. **Writtle**, W. of Chelmsford. Abundant at Shackleton's Farm; 2 ♀ ♀, with *Culex pipiens*, rec. 26, xi, 1917; coll'd. J. F. Macdonald; det. W. D. L. *L. G. B.*

## GLOUCESTERSHIRE.

170. **Bristol**. (1) At 50–100 ft.; larvae in pond on waste ground near colliery on railroad; 6, ix, 1900; obs. T. Strangeways-Pigg. *N. 1901.* (2) *T's. MS.*
171. **Cheltenham**. (1) 1 ♀, rec. 15, x, 1917; coll'd. C. J. Gardiner; det. W. D. L. *P. S.* (2) vii and viii, 1906 and 1907. *T's. MS.*
172. **Cranham**, N.E. of Painswick, S.E. of Gloucester. Pig-sty at Cranham sanatorium, in Cotteswold Hills, at 840 ft. O.D.; 11 ♀ ♀ obtained in 3 mins.; 0.10 p.m.; 25, x, 1917; fine weather; cold temperature; coll'd. A. J. Grove. *L. G. B.*
173. **Gloucester**. vii and viii, 1907. *T's. MS.*
174. **Longford**, N.E. of Gloucester. Manor Farm (Mr. Seville); cow-shed and pig-sty; 6 ♀ ♀ (2 full of blood) obtained in 5 mins.; 3.5 p.m.; 23, x, 1917; showery weather; cold temperature; coll'd. A. J. Grove. *L. G. B.*
175. **Painswick**, S.E. of Gloucester. At 600 ft. O.D.; Damseli's Farm; pig-sty and cow-shed; 7 ♀ ♀, with *Culicines*, obtained in 10 mins.; 3.0 p.m.; 25, x, 1917; fine weather; cold temperature; coll'd. A. J. Grove. *L. G. B.*
176. **Sandhurst**, N. of Gloucester; (a) Wallsworth Farm (Mr. Bishop); cow-shed; 16 ♀ ♀, with *Culicines*, obtained in 10 mins.; 3.40 p.m.; (b) Moat Farm (Mr. Drinkwater); cow-shed; 6 ♀ ♀, with *Culicines*, obtained in 5 mins.; 4.10 p.m.; both on 23, x, 1917; showery weather; cold temperature; coll'd. A. J. Grove. *L. G. B.*
177. **Stroud**. (1) Callowell Farm; cow-shed; 1 ♀ obtained in 10 mins.; 3.55 p.m.; 25, x, 1917; fine weather; cold temperature; coll'd. A. J. Grove. *L. G. B.* (2) 2 ♀ ♀; vii, 1907. *T's. MS.*
178. **Twigworth**, N.E. of Gloucester. Greenway Farm (Mr. Gibbon); stable; 5 ♀ ♀ obtained in 5 mins.; 3.30 p.m.; 23, x, 1917; showery weather; cold temperature; coll'd. A. J. Grove. *L. G. B.*

## HAMPSHIRE.

179. **Aldershot**. [See also localities in this district in Surrey.] Many ♀ ♀ received alive; 16, x, 1917; coll'd. Capt. A. Parsons, R.A.M.C.; det. W. D. L.
- [181]. **Bournemouth**. Recorded by Lt.-Col. S. P. James, I.M.S. *A. J. G. L. G. B.*
180. **Brockenhurst**. (1) 1 ♀, in house; 18, vi, 1900; coll'd. C. O. Waterhouse. *British Museum Collection.* (2) many; viii, 1914. *T's. MS.*
181. **Christchurch**. [See also **Bournemouth**.] *T's. MS.*
182. **Fareham**. (1) At 50 ft. or less; very many larvae in a pond; 31, viii, 1900; obs. T. Strangeways-Pigg. *N. 1901.* (2) *T's. MS.*
183. **Lymington**. viii, 1914. *T's. MS.*
184. **Lyndhurst**. (1) viii, 1914. *T's. MS.* (2) Lyndhurst Road, New Forest; 1 ♀; 1894; coll'd. Lt.-Col. Yerbury. *British Museum Collection.*



185. **Newport**, I. of Wight. *T's. MS.*
186. **Odiham**, E. of Basingstoke. (1) At 200-300 ft.; many larvae in a ditch; 31, viii, 1900; obs. T. Strangeways-Pigg. *N. 1901.* (2) *T's. MS.*
187. **Portsmouth**. (1) Near sea-level; among thick ivy bushes, at end of viii; eggs, larvae, and pupae, with *Culex*-larvae, in a small stone tank, fed occasionally from a tap, and containing algae; obs. Basset-Smith. *N. 1901.* (2) *T's. MS.*
188. **Ringwood**. *T's. MS.*
189. **Sandford**, N. of Ventnor, I. of Wight. (1) At 200 ft. or less; larvae in a pond; 31, viii, 1900; obs. T. Strangeways-Pigg. *N. 1901.* (2) *T's. MS.*
190. **Ventnor**, I. of Wight. A few, vii, 1910. *T's. MS.*
191. **Winchester**. *T's. MS.*
192. **Yarmouth**, I. of Wight. ♀; viii, 1914. *T's. MS.*

#### HEREFORDSHIRE.

193. **Hereford**. 2 ♀ ♀; viii, 1908. *T's. MS.*
194. **Ledbury**. Many; vi and vii, 1907, and vii, 1903. *T's. MS.*
195. **Putley Court**, W. of Ledbury. viii, 1907. *T's. MS.*
196. **Ross**. Common, viii, 1906. *T's. MS.*
197. **Symond's Yat**, S.W. of Ross. Common, viii, 1906. *T's. MS.*
198. **Tarrington**, E. of Hereford. (1) Tarrington rivulet; 1 ♀; 26, ix, 1895; cold. \*Lt.-Col. Yerbury. *British Museum Collection.* (2) *T's. MS.*

#### HERTFORDSHIRE.

199. **Bishop's Stortford**. (1) At 200-300 ft.; larvae in a stream; 5, viii, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*
200. **Hatfield**. 1 ♀; 1900. *T's. MS.*
201. **Hitchin**. (1) 2 ♀ ♀; iii, 1899. *T's. MS.* (2) Larvae numerous on weedy edges of R. Oughton; vii, 1915; obs. F. W. Edwards. *A. J. G. L. G. B.*
- Letchworth**. (1) Larvae numerous in open water-tank; ix, 1917; (2) in house; ix, 1916; both obs. F. W. Edwards. *A. J. G. L. G. B.*
202. **Little Hadham**, N.W. of Bishop Stortford. Common indoors. *T's. MS.*
203. **Royston**. *T's. MS.*

#### HUNTINGDONSHIRE.

204. **Fen Stanton**, S.E. of Huntingdon. (1) At the sixth mile-post from Godmanchester, at 50 ft. or less; larvae very numerous in a broad ditch, 3 ft. deep, of flowing water, and containing algae; 21, vii, 1900; obs. G. H. F. Nuttall. *N. 1901.* (2) *T's. MS.*
205. **Great Staughton**, S.E. of Kimbolton. Common, from 1887 to 1890. *T's. MS.*
206. **Kimbolton**. Larvae and imagines common. *T's. MS.*
207. **Houghton to St. Ives**. At about 25 ft. O.D.; larvae plentiful along river banks all the way; 5, vii, 1901; obs. G. H. F. Nuttall. *N. 1905.*

208. **Ramsey.** At 50 ft. or less. (1) Larvae very plentiful in a ditch, containing *Spirogyra* and *Lemna*, near the Abbey; (2) a few larvae in a ditch of not such clear water, on the fen, one mile distant; 3, viii, 1901; obs. T. S. Pigg; det. G. H. F. Nuttall. *N.* 1905.
209. **St. Ives.** (1) At 50 ft. or less; larvae in a small ditch, estuary into Ouse, on Houghton path; 21, vii, 1900; obs. G. H. F. Nuttall. *N.* 1901. (2) *T's. MS.*
210. **St. Neots.** (1) Common, 1887 to 1890. *T's. MS.* (2) At 100 ft. or less; abundant in spring-time, and caught during a number of years; obs. Theobald, 1900. *N.* 1901.
211. **Swineshead,** S.W. of Kimbolton. Often, 1887 to 1890. *T's. MS.*
212. **Wood Walton Fen,** W. of Ramsey. 1 ♀; 13 to 15, v, 1914; coll'd. F. W. Edwards. *British Museum Collection.*

## KENT.

213. **Ashford.** *T's. MS.*
214. **Bearsted,** E. of Maidstone. Can nearly always be found—commoner some years than others. *T's. MS.*
- [262]. **Bexley Heath,** S.E. of Woolwich. (1) 1 ♀; in bedroom; afternoon; (2) larvae in clear water of permanent swampy ground with hoof-marks; some duckweed; no fishes; cattle near at hand; also trees; houses within 100 yds.; both on 27, ix, 1917; bright sunshine; temperature 65°; obs. Mrs. A. Macdonald. *A. J. G. L. G. B.*
- [246]. **Blackmanstone,** S.W. of Hythe. See under Romney Marshes (3).
215. **Bleau,** N.W. of Canterbury. On many occasions. *T's. MS.*
216. **Borden,** W. of Sittingbourne. Can nearly always be found—commoner some years than others. *T's. MS.*
- [246]. **Brenzett,** S.W. of Hythe. See under Romney Marshes (3).
- [246]. **Brookland,** S.W. of Hythe. See under 246 Romney Marshes (3).
217. **Canterbury.** (1) At 100 ft. or less; iv, 1898; obs. Theobald. *N.* 1901. (2) *T's. MS.*
218. **Charing,** N.W. of Ashford. Often found, sometimes very annoying; larvae also taken. *T's. MS.*
219. **Chartham,** S.W. of Canterbury. Often found, sometimes very annoying; larvae also taken. *T's. MS.*
- [232]. **Chattenden,** N. of Rochester. In fair numbers; iii, 1918. *W. O.*
220. **Chilham,** S.W. of Canterbury. Often found, sometimes very annoying; larvae also taken. *T's. MS.*
221. **Cliffe,** E. of Gravesend. *T's. MS.*
222. **Cranbrook,** E. of Tunbridge Wells; v, 1904. *T's. MS.*
223. **Deal.** 2 ♀ ♀ and 1 ♂; vii, 1911. *T's. MS.*
224. **Dover.** *T's. MS.*
225. **Dymchurch,** S.W. of Hythe. (1) Peartree Farm; shed in farm-yard; 5 ♀ ♀ obtained in 5 mins.; 3.20 p.m.; (2) Slodden Farm; (a) cow-shed; 20 ♀ ♀ obtained in 10 mins.; 3.40 p.m.; (b) outside water-closet; 3 ♂ ♂, 3 ♀ ♀, and a *Culicine*, obtained in 2 mins.; 3.50 p.m.; all on 20, ix, 1917; fine weather; cool temperature; coll'd. A. J. Grove. *L. G. B.* (3) See under 246 Romney Marshes (3).
226. **Eastwell,** N. of Ashford. Often found, sometimes very annoying; larvae also taken. *T's. MS.*
- [262]. **Erith,** E. of Woolwich. (1) A house about 50 yards from (2); in bedroom; 2 ♀ ♀, with 1 *Culex pipiens*; (many other houses in the



neighbourhood of ditches that seemed possible breeding-places were visited, but few mosquitoes were found, and in every case these were *Culex pipiens*; (2) larvae in permanent ditches on Picardy Manor Way—swampy ground where one ditch spreads out after rain, and with muddy pools in the course of the other; water clear, but with some weed in both cases; no fishes seen; a few water-scorpions present; houses within 50 yds.; road frequented by children; no cattle near; (3) larvae in shallow part of a permanent ditch in the marsh, with clear water, some *Spirogyra*, but no fishes seen; houses within  $\frac{1}{2}$  mile; cattle feeding close at hand; no trees; all on 26, ix, 1917; obs. Mrs. A. Macdonald. A. J. G. L. G. B.

- [246]. **Fairfield**, S.W. of Hythe. See under Romney Marshes (3).  
 227. **Faversham**. Can always be found; more common some years than others. T's. MS.  
 228. **Folkestone**. (1) At 150 ft. or less; 1, iv; obs. Theobald. N. 1901. (2) T's. MS.  
 [232]. **Fort Grain**. In fair numbers; iii, 1918. W. O.  
 229. **Gravesend**. (1) At 50 ft. or less; many larvae in one ditch only; 6, ix, 1900; obs. W. Mitchell. N. 1901. (2) T's. MS.  
 230. **Great Chart**, S.W. of Ashford, T's. MS.  
 231. **Headcorn**, W. of Ashford. T's. MS.  
 232. **Hoo**, N. of Chatham. (See also **Chattenden**, **Fort Grain**.) T's. MS.  
 233. **Hythe**. Many in viii, ix, x, and i. T's. MS.  
 [246]. **Ivychurch**, S.W. of Hythe. See under Romney Marshes (3).  
 234. **Leeds**, S.E. of Maidstone. Can nearly always be found; more common some years than others. T's. MS.  
 235. **Lenham**, S.E. of Maidstone. T's. MS.  
 236. **Lydd**, S.W. of Hythe. (1) Many; iv and viii, 1915 and 1917. T's. MS. (2, a) Dennis' Farm; cow-shed; 10 ♀♀ obtained in 3 mins.; 9.40 a.m.; (b) Dering Farm; 2 ♂♂ and 1 ♀, with *Culicines*, obtained in 5 mins.; 10.40 a.m.; both on 21, ix, 1917; fine weather; cool temperature; (c) room in building; 2 ♂♂, with *Culicines*, obtained in 3 mins.; 9.20 a.m.; (d) room in building; 1 ♀, with *Culicines*, obtained in 5 mins.; 9.40 a.m.; (e) stable; 12 ♀♀ obtained in 2 mins.; 9.55 a.m.; the last three records, 5, x, 1917; fine weather; cold temperature; all colld. A. J. Grove. L. G. B. (3) See under 246 Romney Marshes (3).  
 237. **Lympne**, W. of Hythe. (1) Below castle and in houses; vii, 1913. T's. MS. (2) In stable with horse; about 50 ♀♀; 24, ii, 1918; colld. Capt. A. Macdonald; per Dr. G. A. K. Marshall.  
 238. **Maidstone**. Can nearly always be found; more common some years than others. T's. MS.  
 239. **Minster**, W. of Ramsgate. Common in 1901, and "bad" in xi, 1908. T's. MS.  
 240. **New Romney**, S.W. of Hythe. (1) ♀♀; vii, 1917. T's. MS. (2a) Martin House; outside water-closet; 17 ♂♂ and 5 ♀♀, with *Culicines*, obtained in 10 mins.; 3.40 p.m.; (2b) chicken-house; 2 ♂♂ and 12 ♀♀ obtained in 15 mins.; 4.45 p.m.; both on 19, ix, 1917; rainy weather; cool temperature; (2c) Ship Hotel; bedroom; 2 ♀♀, with 1 *Culicine*, obtained in 3 mins.; 8.0 a.m.; (2d) near West-town Cottage; cow-sheds; 5 ♂♂ and 4 ♀♀ obtained in 5 mins., 10.10 a.m.; and 4 ♂♂ obtained in 2 mins., 10.20 a.m.; (2e) Spitalfield Lane; shelter for horse; 5 ♂♂ and

- 3 ♀ ♀ obtained in 5 mins.; 11.5 a.m.; (2f) Filcher's Farm; cow-shed; 4 ♂ ♂ and 16 ♀ ♀, with Culicines, obtained in 10 mins.; 11.40 a.m.; (2g) Master's Farm; cow-shed; 19 ♀ ♀ obtained in 5 mins. (but very abundant in this shed); 2.5 p.m.; the last five records on 20, ix, 1917; fine weather; cool temperature; all cold. A. J. Grove. *L. G. B.* (3) Cow-house; about 30 ♀ ♀; 25, ii, 1918; cold. Dr. Hinks; per Capt. A. Macdonald and Dr. G. A. K. Marshall. (4) See under 246 Romney Marshes (3).
- [246]. **Old Romney**, S.W. of Hythe. See under 246 Romney Marshes (3).
241. **Pegwell Bay**. 2 ♀ ♀; 1902. *T's. MS.*
242. **Queenborough**, I. of Sheppey. (1) At 50 ft. or less; larvae fairly numerous in a pond; 5, ix, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.* (3) Recorded by Lt.-Col. S. P. James, I.M.S. *A. J. G. L. G. B.*
243. **Queen's Bridge**, S. of Queenborough, I. of Sheppey. (1) At 50 ft. or less; a few larvae in a ditch of not-clear water; 5, ix, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*
244. **Rainham**, S.E. of Chatham. (1) Can nearly always be found; more common some years than others. *T's. MS.* (2) East Court Farm, N.W. of Rainham; obs. Capt. A. Macdonald, in letter to Dr. G. A. K. Marshall, 11, iii, 1918.
245. **Rochester**. Can nearly always be found; more common some years than others. *T's. MS.*
246. **Romney Marshes**. [See also 240 New Romney, 236 Lydd, and 247 St. Marys; includes also other places mentioned in record (3).] (1) Always present. *T's. MS.* (2) Col. A. Alcock is accustomed to get specimens for laboratory work from this locality (letter, 20, v, 1917). *H. S.* (3) Romney Marshes (including New Romney, Old Romney, Lydd, Brookland, Fairfield, Dymchurch, Ivychurch, Blackmanstone, St. Marys and Brenzett). *A. maculipennis* is the prevailing species, existing "in as great numbers as I have even seen in tropical countries, and are more numerous than in any other locality I have examined in England." In October it outnumbered all the other Culicidae. Numerous Anopheline larvae in ditches in iii, 1918; and three pupae bred out in the middle of March produced *A. maculipennis*. *W. O.*
247. **St. Marys**, S.W. of Hythe; (1) ♀; vii, 1917. *T's. MS.* (2) See under 246 Romney Marshes (3).
248. **Sandwich**. (1) 1889 and 1913. *T's. MS.* (2, a) New St., Dr. Kerswill's surgery; 1 ♀, with 1 ♀ *A. bifurcatus* and Culicines, obtained in 2 mins.; 6.30 p.m. (dark); 28, ix, 1917; fine weather; cool temperature; (b) near Woodnesborough Road, E. Lawrence's cow-shed; 10 ♀ ♀ and 1 ♂, with 1 ? *A. bifurcatus* and 8 Culicines, obtained in 10 mins.; 2.45 p.m.; (c) 1 ♂ and 1 ♀, with 1 ♀ *A. bifurcatus* and Culicines, obtained, in the same place, in 5 mins.; 3.15 p.m.; the last two records on 29, ix, 1917; fine weather; warm temperature; all cold. A. J. Grove. *L. G. B.* (3) Imagines plentiful in Oct., 1916, and larvae in great numbers in most of the ditches; at present (iii, 1918) imagines are found in cellars and outhouses. *W. O.*
249. **Sevenoaks**. 17, i, 1908, and 1912. *T's. MS.*
250. **Sheerness** and district. (1) See British Medical Journal, Supplement, for 28th Oct., 1905, p. 240. At a meeting of the Canterbury and Faversham Division of the South Eastern Branch of the British Medical Association, Surgeon Giltings showed specimens of *A. maculipennis* and of other mosquitoes—non-Anopheline—obtained



at or near Sheerness. The *Anopheles* were bred from larvae collected near Sheerness, in ditches. A medical man residing in East Sheerness said that small outbreaks of malaria had been occurring in Sheerness. *H. S.* (2) Recorded by Lt.-Col. S. P. James, I.M.S. *A. J. G. L. G. B.* (3) In Sheppey and I. of Grain, in cow-sheds and stables fed and feeding on a horse; at Holm Place, near Queenborough; Pye's Farm, near Sheerness; Co-operative Dairy, West Minster; Scockles Farm; Swanley Farm; Warden Court (in myriads and lively); and Muggeridge's Farm; near Fort Grain; obs. Capt. A. Macdonald, in letter to Dr. G. A. K. Marshall, 11, iii, 1918.

251. **Shoreham**, N. of Sevenoaks } Can nearly always be found—commoner some years than others.  
252. **Sittingbourne** } *T's. MS.*
253. **Strood**, N.E. of Chatham. *T's. MS.*
254. **Swanley**, S. of Dartford. Can nearly always be found—commoner some years than others. *T's. MS.*
255. **Tenterden**, S.W. of Ashford. (1) At 200 ft. or less; iv, 1900; obs. Theobald. *N. 1901.* (2) *T's. MS.*
256. **Tonbridge**. Often. *T's. MS.*
257. **Tunbridge Wells**. 2 ♀ ♀; 1899. *T's. MS.*
258. **Walmer**. ♀ ♀; 1, vi, 1903. *T's. MS.*
259. **Westwell**, N. of Ashford. Often found; sometimes very annoying; larvae also taken. *T's. MS.*
262. **Woolwich**. [See also **Bexley Heath** and **Erith**.] *T's. MS.*
263. **Woodnesborough**, S.W. of Sandwich. 1889 and 1913. *T's. MS.*
264. **Wye**, N.E. of Ashford. (1) 1 ♀; v, 1900; coll'd. F. V. Theobald. *British Museum Collection.* (2) Often found, sometimes very annoying; larvae also taken; has been very vicious in the village this summer [1917], especially in viii; I find that, in houses, it always occurs on the first floor, whilst *A. bifurcatus* is found on the ground floor. *T's. MS.* (3) At 150 ft. or less; abundant from i-v and again in autumn; obs. Theobald 1895–1900. *N. 1901.*

#### LANCASHIRE.

265. **Bay Horse**, S. of Lancaster. (1) At 100 ft. or less; larvae fairly numerous, in one spot only of a ditch of running water, with algae; 14, ix, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*
266. **Catterall**, S.W. of Garstang, N. of Preston. (1) At 100 ft. or less; larvae (from which the imago was raised) plentiful in ponds; more at Garstang in ponds and streams; 14, ix, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*
267. **Kirkham**, N.W. of Preston. (1) At 50 ft. or less; 2 larvae only, in duck-pond; 11, ix, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*
268. **Liverpool** district. Relatively scarce; obs. Prof. R. Newstead; 4, v, 1917. (See also under *A. bifurcatus*, 530 Liverpool.)
269. **Lytham**, W. of Preston. (1) At 50 ft. or less; a few small larvae in a ditch on the road to Kirkham; 11, ix, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*
270. **Morecambe**. (1) Morecambe, and on the road to Lancaster; at 50 ft. or less; larvae fairly numerous in some ditches; 12, ix, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*
271. **Preston**. (1) At 50 ft. or less; 3 larvae only, in pond by canal on road to Fulwood; 11, ix, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*

272. **St. Anne's-on-the-Sea**, W. of Preston. (1) At 50 ft. or less; 1 larva; 1900; obs. Swainson; per Theobald. *N. 1901.* (2) *T's. MS.* (3) ix and x, 1912; obs. H. Bury. *A. J. G. L. G. B.*
273. **Ulverston.** *T's. MS.*
274. **Walmer Bridge** (Wallmoor Bridge), S.W. of Preston. (1) At 50 ft. or less; very few small larvae in cattle-pond, with *Culex*-larvae; 10, ix, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*

## LINCOLNSHIRE.

275. **Bardney**, E. of Lincoln. *T's. MS.*
276. **Bourne.** *T's. MS.*
277. **Cadney**, S.E. of Brigg. At 100 ft. or less; 1 ♀ in house, with 5 *Culex*, on a cold, raw day; 23, iii, 1901; obs. E. A. Woodruffe-Peacock; det. G. H. F. Nuttall. *N. 1905.*
278. **Cowbit**, S. of Spalding. (1) At 50 ft. or less; larvae numerous in ditches all along the road to Eye Green; 21, vii, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*
279. **Crowland.** (1) At 50 ft. or less; larvae numerous in ditches all along the road to Eye Green; 21, vii, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*
280. **East Fen**, N.E. of Boston. *T's. MS.*
281. **Gedney**, E. of Holbeach. (1) At 50 ft. or less; larvae numerous in ditches all along the road to Eye Green; 21, vii, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*
282. **Grantham.** (1) At 200 ft. or less; obs. Thornley. *N. 1901.* (2) *T's. MS.*
283. **Holbeach.** (1) At 50 ft. or less; larvae numerous in ditches all along the road to Eye Green; 21, vii, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*
284. **Lincoln.** *T's. MS.*
285. **Long Sutton.** (1) At 100 ft. or less; larvae and pupae numerous in ditches both east and west; 21, vii, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*
286. **Louth.** 21, viii, 1912. *T's. MS.*
287. **Mablethorpe.** 1 ♀; 21, viii, 1912. *T's. MS.*
288. **Panton**, N.W. of Wragsby. Common, 1906 and 1912. *T's. MS.*
289. **Spalding.** (1) At 50 ft. or less; larvae numerous in ditches all along the road to Eye Green; 21, vii, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*
290. **Wragsby.** Common; 1906 and 1912. *T's. MS.*

## MIDDLESEX.

291. **Acton.** ♀; in house; 8, ix, 1899; coll'd. C. O. Waterhouse. *British Museum Collection.*
292. **Enfield.** *T's. MS.*
293. **London, Brondesbury.** *T's. MS.*
294. **London, Ladbroke Grove.** (1) At 150 ft. or less; x, 1900; obs. Theobald. *N. 1901.* (2) *T's. MS.*

295. **London, N.W.** At 250 ft. or less; x, 1900; obs. Theobald. *N. 1901.*  
 296. **Stanmore.** *T's MS.*  
 297. **West Drayton.** 3 ♂♂ and 1 ♀; 28, viii, 1903; coll'd. W. R. O. Grant. *British Museum Collection.*

# MONMOUTHSHIRE.

298. **Chepstow.** (1) In house; ix, 1901; obs. J. Cropper. *N. 1905.*  
 (2) Common; vii, 1907. *T's MS.*  
 299. **Monmouth.** 1 ♀ in garden, near town; vii, 1907. *T's MS.*  
 299a. **Newport.** ♀ in house; 9.30 p.m.; 21, xi, 1917; rec. by National Museum of Wales; per J. Davy Dean. *A. J. G. L. G. B.*

# NORFOLK.

300. **Acle.** (1) At 100 ft. or less; larvae numerous in roadside ditches (fen-drains) containing *Spirogyra*; 3, viii, 1900; obs. G. H. F. Nuttall. *N. 1901.* (2) *T's MS.*  
 301. **Billockby, N.W. of Yarmouth.** (1) At 50 ft. or less; larvae numerous in roadside ditches (fen-drains) containing *Spirogyra*; 3, viii, 1900; obs. G. H. F. Nuttall. *N. 1901.* (2) *T's MS.*  
 302. **Brundall, E. of Norwich.** (Also applies to 303 **Burlingham**, 305 **Castleacre**, 310 **Harleston**, 312 **Horsey**, 319 **South Walsham**, and 321 **Twyford**.) Imagines and larvae; observations spread over about 18 months. See Sydney H. Long, "A preliminary list of Mosquitoes of Norfolk," *Trans. Norfolk and Norwich Nat. Soc.*, 1902, vol. vii, p. 353. *H. S.*  
 303. **Burlingham, E. of Norwich.** See under 302 Brundall.  
 304. **Burnhamthorpe, E. of Burham Westgate.** *T's MS.*  
 305. **Castleacre, N. of Swaffham.** See under 302 Brundall.  
 306. **Cromer.** (1) At 100 ft. or less; 1; ix, 1907; obs. Theobald. *N. 1901.*  
 (2) *T's MS.*  
 307. **Dickleborough, N.E. of Diss.** 19, vii; obs. J. E. Collin. *H. S.*  
 308. **Diss.** (1) 21, vii; obs. J. E. Collin. *H. S.* (2) At 100 ft. or less; 19, vii, and 21, viii; obs. Verrall. *N. 1901.* (3) *T's MS.*  
 309. **East Dereham.** *T's MS.*  
 310. **Harleston.** See under 302 Brundall.  
 311. **Holt.** (1) 1 ♀; ix, 1887. *T's MS.* (2) 1 ♀; on roof of ground floor, outside lavatory; 2.15 p.m.; 20, iii, 1918; coll'd. G. H. Locket; det. W. D. L. *P. S.*  
 312. **Horsey, N.W. of Yarmouth.** See under 302 Brundall.  
 313. **Hunstanton.** 1 ♀; ix, 1901. *T's MS.*  
 314. **King's Lynn.** (1) At sea-level; (a) near the station; larvae (mostly small) plentiful in large and small ditches of deep, cool water, with algae; (b) eggs, larvae and pupae very numerous in brackish pool, east of R. Ouse estuary, containing algae, chiefly *Ulva (Tetraspora)*; 14, vii, 1900; obs. G. H. F. Nuttall. *N. 1901.* (2) *T's MS.*  
 315. **Norwich.** (1) At 50 ft. or less; iv, 1897; obs. Theobald. *N. 1901.*  
 (2) *T's MS.*  
 316. **Potter Heigham, N.E. of Norwich.** Recorded in a letter from S. H. Long to A. J. Grove. *L. G. B.*



317. **St. Olaves**, S.W. of Yarmouth. (1) Near sea-level; near station; larvae (from which the imago was raised) in ditch of brackish water and containing algae; 3, viii, 1900; obs. G. H. F. Nuttall. *N. 1901.* (2) *T's. MS.* (3) In large numbers; obs. S. H. Long. *A. J. G. L. G. B.*
318. **Sheringham.** *T's. MS.*
319. **South Walsham**, N.E. of Norwich. See under 302 Brundall.
320. **Sutton Broad** (Stalham Broad), N.E. of Norwich. (1) 1 ♀; ix, 1908; coll'd. Prof. E. A. Minchin. *British Museum Collection.* (2) Very common; obs. S. H. Long. *A. J. G. L. G. B.*
321. **Twyford**, N. of East Dereham. See under 302 Brundall.
322. **Walpole**, W. of King's Lynn. *T's. MS.*
323. **Walsingham.** *T's. MS.*
324. **Wells.** *T's. MS.*
325. **Wroxham**, N.E. of Norwich. (1) ix, 1902. *T's. MS.* (2) Recorded in a letter from S. H. Long to A. J. Grove. *L. G. B.*
326. **Wymondham.** *T's. MS.*
327. **Yarmouth.** (1) At sea-level; larvae (from which imagines were subsequently raised) numerous in a ditch containing *Spirogyra*; 3, viii, 1900; obs. G. H. F. Nuttall. *N. 1901.* (2) *T's. MS.*

## NORTHAMPTONSHIRE.

328. **Eye Green**, N.E. of Peterborough. (1) At 50 ft. or less; larvae numerous in ditches all along the road to Eye Green; here were larvae of *Culex*, but not of *Anopheles*, in a water-butt; 21, vii, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*
329. **Wellingborough.** *T's. MS.*

## NORTHUMBERLAND.

330. **Hexham.** 7, ix, 1909. *T's. MS.*

## NOTTINGHAMSHIRE.

331. **South Leverton**, E. of East Retford. (1) Highest land 250 ft. O. D.; 1 ♀, 10, ii, 1898; obs. Grimshaw. *N. 1901.* (2) Occurs sparingly on the windows of the house, often during winter; 2 ♀ ♀, 10, ii, and 7, iv, 1898; and 1 ♂, ix, 1900; obs. Thornley. *N. 1901.* (2) *T's. MS.*

## OXFORDSHIRE.

332. **Clifton Hampden**, S. of Oxford. (1) At 140 ft.; a few larvae in flowing water in a ditch communicating with the river; 13-14, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
333. **Mapledurham**, N.W. of Reading, Berks. (1) At 100 ft.; very many larvae in middle of R. Thames between an island and the shore; slowly flowing water; flags and much *Ulva*; 17, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
334. **Oxford** and neighbourhood. (1) At 190 ft.; a few larvae found, after a long search, in ditches in Port Meadow; many little fishes present; 12, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.* (3) City of Oxford; ♀ ♀ in houses in the city during the months ii, iii (biting

in house after dark), vi (biting in house after dark), viii, ix, xi and xii; the ♀ ♀ probably hibernate; from a report received, ix, 1917, from A. H. Hamm, the result of observations and notes made during the last three years. H. S. (4) Since sending my last notes, Mr. Britten and myself have scrutinised hundreds of Culicidae for this species. So far, only two specimens have been detected, both ♀ ♀; one of these was in a house (and that one not in the centre of the city), and the other on a fence on the outskirts. We have also searched every Saturday afternoon from 8, ix, to 20, x (both dates inclusive) for the larvae, but only on one occasion did we find them, on 29, ix, and then only a single example, which produced a ♀ on 12, x. The larva of this specimen was obtained from a small clay-hole filled with surface-water in Taylor's brickyard on Shotover Hill, Oxford. So far, we have not been able to detect this species in the city itself, although in previous years I have usually found a few examples in the Museum, and occasionally in my house, and have had a few brought to me from the vicinity of Port Meadow, taken in houses and biting by night. To sum up, *A. maculipennis* does not appear to be very abundant this autumn, as a very keen look-out has been kept every day for nearly two months past, with the results recorded above. It probably hibernates in the perfect state. As to its being found in the centre of the city, the chances are quite remote. A much longer period of investigation, however, is needed to establish these conclusions. From a supplementary report on *Anopheles* in Oxford, dated 22, x, 1917; obs. A. H. Hamm and H. Britten; per Dr. G. A. K. Marshall. (5a) Worcester College; (i) in two rooms; 2, with 11 Culicines; 7-8 a.m.; 4, ix, 1917; temp. 55.4; weather, damp mist; (ii) a room; 1, with 3 Culicines; 7-8 a.m.; 5, ix, 1917; temp. 61.7; weather, bright sunshine; (5b) Ruskin College, hall and kitchen; (i) 2, with 14 Culicines; 9.0 a.m.; 5, ix, 1917; temp. 61.7; sunshiny weather; (ii) 1, with 8 Culicines; 9.0 a.m.; 6, ix, 1917; sunshiny weather; (5c) Richmond Road; (i) bedroom; 1; 7.30 a.m.; 3, ix, 1917; temp. 58.8; sunshiny weather; (ii) garden shed; 1, with 2 Culicines; 8.0 a.m.; 4, ix, 1917; temp. 55.4; misty weather; (5d) canal bank; wood-shed; 2, with 3 Culicines; 9.0 a.m.; 5, ix, 1917; sunshiny weather; (5e) Worcester Place; bedroom; 1; 7.30 a.m.; 4, ix, 1917; sunshiny weather; (5f) Norham Gardens; 1, with 4 Culicines; 11.0 a.m.; 6, ix, 1917; sunshiny weather; (5g) Old river; larvae in permanent backwater, used to carry off flood-water from R. Thames; with muddy bottom, overgrown banks, and frequent beds of sedges; clear water; not much current; with small fishes, and ducks near houses; houses quite close; no trees; no cattle in vicinity; 31, viii, and 1, ix, 1917; temp. (of air) 52°-59° at 9.0 p.m.; cloudy and rainy weather; (5h) R. Cherwell; larvae in a permanent backwater among sedges; with clear water, no weed; fishes present; houses 300-500 yds. away; trees on river bank and cattle in numbers in meadows; 3, ix, 1917; temp. (of air) 58.2 at 9.0 p.m.; sunshiny weather; (5i) R. Cherwell; larvae in permanent drainage-ditches at ferry, Mesopotamia Walk; with *Spirogyra*, some duckweed, no fishes, houses 300-500 yds. distant, trees on river bank, and cattle in numbers in meadows; 4, ix, 1917; temp. (of air) 56.2 at 9.0 p.m.; bright sunshiny weather; all obs. Mrs. A. Macdonald. A. J. G. L. G. B.

335. **Sandford**, S. of Oxford. (1) At 170 ft.; (a) a few larvae above the weir among reeds and rushes and on both sides, also in neighbouring ditches; (b) plentiful below weir among much algae; 12-13, ix, 1900; obs. L. Cobbett. N. 1901. (2) T's. MS.

336. **Whitchurch**, N.W. of Reading, Berks. (1) At 105 ft.; larvae fairly numerous in small, shallow bay, with plenty of algae, in R. Thames, 1 m. below Whitchurch; 17, ix, 1900; obs. L. Cobbett. *N.* 1901. (2) *T's*. *MS.*

## SHROPSHIRE.

337. **Acton Burnell**, W. of Much Wenlock. 24 ♀♀ in Acton Burnell Church; 18, xii, 1917; obs. R. F. L. Burton. *A. J. G. L. G. B.*
338. **Atcham**, S.E. of Shrewsbury. [See also **Wroxeter**.] 24 ♀♀; 20, xi, 1917; obs. R. F. L. Burton. *A. J. G. L. G. B.*
339. **Belswardyne Hall**, N.W. of Much Wenlock. [See also **Cressage** and **Harley**.] 10 ♀♀ from a cow-shed (in use); 8, i, 1918; obs. R. F. L. Burton. *A. J. G. L. G. B.*
340. **Berrington**, S.E. of Shrewsbury. [See also **Betton**.] 24 ♀♀ in Berrington Church; 11, xii, 1917; obs. R. F. L. Burton. *A. J. G. L. G. B.*
341. **Berwick Grove**, S.E. of Shrewsbury. In a farm building, in a hay-loft above an occupied cart-horse stable; and a few flies in the stable itself; 24 ♀♀; 27, xii, 1917; one of the flies was full of blood (or of some red fluid), and this proves that the fly was moving about, even in the middle of the hibernating period; obs. R. F. L. Burton. *A. J. G. L. G. B.*
- [340]. **Betton**, S.E. of Shrewsbury. Betton Abbott's Farm (Mr. Owen); cow-shed; 1 ♂ and 16 ♀♀, with 3 *Culicines*, obtained in 3 mins.; 11.15 a.m.; 15, x, 1917; *Anopheles* present in numbers on the roof of this shed; fine weather; cold temperature; obs. and coll. A. J. Grove. *L. G. B.*
342. **Chilton Grove**, S.E. of Shrewsbury. ♀; in farm buildings; obs. R. F. L. Burton. *A. J. G. L. G. B.*
- [339]. **Cressage**, N.W. of Much Wenlock. 3 in Cressage Church (appear to be fewer than nearer Shrewsbury); 8, i, 1918; obs. R. F. L. Burton, *A. J. G. L. G. B.*
343. **Crick Heath**, S. of Oswestry. Battlefield Farm; 7 ♀♀, with 2 *Culicines*, obtained in 2 mins.; 3.50 p.m.; 19, x, 1917; coll. A. J. Grove. *L. G. B.*
- [339]. **Harley**, N.W. of Much Wenlock. 14; around clock of Harley Church; 15, i, 1918; obs. R. F. L. Burton. *A. J. G. L. G. B.*
344. **Longner Hall**, S.E. of Shrewsbury. [See also **Uppington** and **Upton Magna**.] (1, a) Bedroom; 3 ♀♀ on wall, noticed in 2 mins.; 2.10 p.m.; (b) Clock-tower (highest point in the building); 7 ♀♀ obtained in 3 mins; 2.15 p.m.; (c) outside water-closet; 9 ♀♀, with 5 *Culicines*, obtained in 3 mins.; 2.25 p.m.; (d) cow-shed; 19 ♀♀, with 3 *Culicines*, obtained in 3 mins.; 2.35 p.m.; all on 20, x, 1917; fine weather; cold temperature; coll. A. J. Grove. *L. G. B.* (2) *Anopheles bifurcatus* is undoubtedly the commonest here, *A. maculipennis* next, and *A. plumbeus* rarest, but by no means rare. *A. maculipennis* lives mostly in buildings, and bites nearly all the year round, if warm enough. Apparently it prefers children to adults; and a hard day's sweating is very attractive to the biter, or she finds one more easily thereby. They can always be found in dark pig-sties, calf-pens, stables, root-houses, dwelling-houses, church-towers, etc., near water. They are to be found a great deal in buildings because they offer the best and commonest shelter; but they occur just as readily in stone-quarries, if the shelter is good. Their numbers vary a great deal from year to year. I have caught



a few of these flies infested with a red parasite (*Trombidium*). The ♂♂ swarm here in lots of ten or twelve. The reason that no exact numbers are given in the accompanying records is that they usually swarm at a height of 18–20 ft., though I have taken them at 7 or 8 ft. When high, they are often in a column of mixed *Chironomus* and other flies, but I do not suppose that I ever saw more than 15 ♂♂ in one swarm. I have never yet attempted daybreak observations in the summer. The ♀ lives through the winter, and is very partial to warmth. As far as I know at present, *A. maculipennis* does move about (at any rate, some individuals do) in the earlier weeks of hibernation, and the same takes place in late February and early March. However, I should not expect them to leave one sheltered building and go a distance to another. But if numbers were to hibernate in, say, a loft above a shed, with plenty of room to get down, I should certainly expect some of the liveliest to come down from time to time. The following are particular records:—

- 1, i, 1906; ♀; hibernating in clock-tower.
- 8, i, 1918; 11 [♀ ♀]; from unused calf-pen.
- 15, i, 1918; 10 [♀ ♀]; from farm buildings.
- 23, i, 1918; 12 [♀ ♀]; " " "
- 29, i, 1918; 4 [♀ ♀]; from dark corner of an open cart-shed.
- 17, ii, 1909; ♀; hibernating in root-shed.
- 19, ii, 1909; ♀; biting by study fire, at night.
- 21, ii, 1909; ♀; on window, trying to get out.
- 3, iii, 1909; ♀; " " "
- 15, iii, 1907; ♀; biting in bedroom.
- 16, iii, 1907; ♀; biting by study fire, at night.
- 23, iii, 1907; ♀; " " " "
- 29, iii, 1907; ♀; " " " "
- 3, iv, 1907; ♀; " " " "
- 6, iv, 1907; ♀; biting by library fire, at night.
- 7, iv, 1907; ♀; " " " "
- 10, iv, 1907; ♀; biting in dining-room, at 10.0 a.m.
- 19, iv, 1909; ♀; biting in laboratory, at 12 noon.
- 27, iv, 1907; ♀; in sandstone quarry.
- 6, v, 1907; ♀; biting in dining-room, in daytime.
- 26, v, 1911; ♂♂; swarming in Severn Meadows, at 8.30 p.m.
- 29, v, 1911; ♂♂; " " " "
- 1, vi, 1908; ♂; sheltering in a pit latrine.
- 1, vi, 1908; ♂; Red Tower.
- 2, vi, 1910; ♂♂; swarming in Severn Meadows, at 8.30 p.m.; infested with *Trombidium*.
- 5, vi, 1909; ♂; sheltering in pit latrine
- 12, vi, 1909; ♂♂; swarming over bridge of bylet ditch, at sunset.
- 12, vi, 1910; ♂♂; swarming in Severn Meadows, at 8.45 p.m.
- 15, vi, 1907; ♀; biting during shearing, at 11.30 a.m.
- 17, vi, 1907; ♂; sheltering in room of pit latrine.
- 18, vi, 1910; ♂; near quarry, at 8.45 p.m.
- 19, vi, 1907; ♂♂; swarming by bridge at rookery gate, at sunset.
- 30, vi, 1909; ♂♂; " " " "
- 3, vii, 1909; ♂; sheltering in room of pit latrine.
- 4, vii, 1906; ♂♂; swarming by bridge at rookery gate, at sunset.
- 6, vii, 1906; ♂♂; " " " during heavy rain.
- 7, vii, 1910; ♂♂; swarming in Severn Meadows, at 9.0 p.m.
- 10, vii, 1910; ♂♂; " " " at 8.30 p.m.
- 12, vii, 1909; ♂♂; " by bridge at rookery gate, at sunset.
- 17, vii, 1906; ♂; in red sandstone quarry.

- 18, vii, 1910; ♂ ♂; swarming in Severn Meadows, at 8.15 p.m.  
infested with *Trombidium*.
- 23, vii, 1910; ♂ ♂; swarming in Severn Meadows, at 8.20 p.m.
- 26, vii, 1906; ♂ ♂; " by bridge at rookery gate.
- 30, vii, 1910; ♂ ♂; " in Severn Meadows at 8.30 p.m.
- 31, vii, 1909; ♂; sheltering in room of pit latrine.
- 4, viii, 1910; ♂ ♂; swarming in Severn Meadows, at 8.0 p.m.
- 5, viii, 1909; ♂; sheltering in room of pit latrine.
- 9, viii, 1908; ♂; " in bedroom.
- 13, viii, 1908; ♂; " in room of pit latrine.
- 23, viii, 1908; ♂; " " "
- 30, viii, 1906; ♂ ♂; swarming in hydraulic-ram house.
- 31, viii, 1910; ♂ ♂; " in Severn Meadows, at 7.15 p.m.
- 4, ix, 1908; ♂; sheltering in room of pit latrine.
- 4, ix, 1910; ♂ ♂; swarming in Severn Meadows, at 7.0 p.m.
- 10, ix, 1910; ♂ ♂; " " " at 6.45 p.m.
- 16, ix, 1910; ♂ ♂; " " " at 6.30 p.m.
- 18, ix, 1910; ♂ ♂; " by bridge at rookery gate.
- 21, ix, 1910; ♂ ♂; " " "
- 24, ix, 1910; ♂ ♂; " in Severn Meadows, at 6.15 p.m.
- 28, ix, 1917; ♂; bedroom, at 2.30 p.m.
- 28, ix, 1917; ♀; resting in latrine, at 12.0 noon.
- 30, ix, 1907; ♂ ♂; swarming by bridge at rookery gate.
- 30, ix, 1910; ♂ ♂; " in Severn Meadows, at 6.0 p.m.
- 4, x, 1910; ♂ ♂; " over drive in Moat Meadow, at 6.0 p.m.
- 6, x, 1909; ♂; one, by bridge at rookery gate.
- 8, x, 1910; ♂ ♂; swarming near quarry, at 5.45 p.m.
- 11, x, 1908; ♂; sheltering in room of pit latrine.
- 15 and 16, x, 1917; ♀ ♀; on windows, at sunset, trying to get out  
of doors; when loosed, apparently flying to nearest bushes.
- 16, x, 1907; ♂; sheltering on gallery wall.
- 18, x, 1917; ♂; one, sheltering in Red Tower.
- 24, x, 1910; ♂ ♂; swarming near quarry, at 5.15 p.m.
- 4, xi, 1917; 10 ♀ ♀; from calf-pen and Moat Wood.
- 13, xi, 1917; 12 ♀ ♀; from upstairs room of Red Tower.
- xi and xii; ♀ ♀ hibernating.

Notes by *R. L. F. Burton*, Esq., of Longner Hall, Shrewsbury, many of which are published in *Theobald*, 1910, pp. 5 and 6; others from notes sent to the *British Museum* and *A. J. Grove*, Esq., of the *L. G. B.*

345. **Market Drayton.** Many; viii, 1908. *T's. MS.*
346. **Morville**, S.E. of Much Wenlock. ♀; 21, ii, 1903; coll. *H. Jenkinson*; det. conf. *F. W. Edwards*; Cambridge University Museum Collection. *H. S.*
347. **Much Wenlock.** (a) Gaskell Arms Hotel; stable; 3 ♀ ♀, with several *Culicines*, observed in 3 mins.; 1.40 p.m.; (b) Marsh Farm, at 620 ft. above sea-level; pig-sty; 5 seen, with several *Culicines*, in 3 mins.; 2.55 p.m.; both on 5, x, 1917; fine weather; cold temperature; obs. *A. J. Grove*. *L. G. B.*
348. **Oswestry.** (a) Drenwydd Farm; pig-sty; 14 ♀ ♀, with 1 *Culicine*, obtained in 5 mins.; 12.5 p.m.; (b) Keeper's Cottage, Twmpath; pig-sty; 2 ♀ ♀ obtained in 3 mins.; 1.0 p.m.; both on 19, x, 1917; fine weather; cold temperature; coll. *A. J. Grove*. *L. G. B.*
- [350]. **Preston**, S.E. of Shrewsbury. 24 ♀ ♀ from farm buildings at Preston-on-Severn; 12 in cow-sheds (half shade), others isolated specimens, and from a cart-horse stable in a dark corner under the stairs leading to loft; a few *Trombidium* on the last, but whether

alive or not, was not observed; 27, xi, 1917; obs. R. F. L. Burton. *A. J. G. L. G. B.*

- [339]. **Shineton** (Sheinton), N. of Much Wenlock. 3 in Sheinton Church belfry (not a good place), and 9 in adjoining farm buildings; 23, i, 1918; obs. R. F. L. Burton. *A. J. G. L. G. B.*
349. **Shirlett** (Shirlot), S.E. of Much Wenlock. Small holding, no. 48 (Mrs. Wilks); cow-shed; 3 seen in 3 mins.; 3.15 p.m.; 15, x, 1917; fine weather; cold temperature; obs. A. J. Grove. *L. G. B.*
350. **Shrewsbury**. [See also **Preston**.] On many occasions in and near the town. *T's. MS.*
- [344]. **Uppington**, N.E. of Shrewsbury; 20, in Uppington Church, where were plenty, but not of easy access; 29, i, 1918; obs. R. F. L. Burton. *A. J. G. L. G. B.*
- Upton Magna**, E. of Shrewsbury. In church; 25 ♀♀ on the underside of the corkscrew stairs on the way to the bell-room; distributed all the way to the top; a few in the clock-room; at least two dozen or more in sight; 1, i, 1918; obs. R. F. L. Burton. *A. J. G. L. G. B.*
351. **Whittington**, N.E. of Oswestry. Big House Farm; stable; 10 ♀♀, with 3 *Culicines*, obtained in 2 mins.; numbers of ♀♀ about this stable; 1.20 p.m.; 19, x, 1917; fine weather; cold temperature; coll. A. J. Grove. *L. G. B.*
- [338]. **Wroxeter**, S.E. of Salisbury. 24; 4, xii, 1917; obs. R. F. L. Burton. *A. J. G. L. G. B.*

#### SOMERSETSHIRE.

352. **Banwell**, N.W. of Axbridge. A farm W. of Banwell; cow-shed; 4 ♀♀, with numerous *Culicines*, obtained in 5 mins.; 3.0 p.m.; 7, xi, 1917; fine weather; cold temperature; coll. A. J. Grove. *L. G. B.*
353. **Bath**. Often found; i, vii and viii; *T's. MS.*
354. **Bleadon**, S.E. of Weston-super-Mare. Pool's Farm; cow-shed; 12 ♀♀, with numerous *Culicines*, obtained in 3 mins.; *Anopheles* very numerous in this cow-shed; 4.20 p.m.; 7, xi, 1917; fine weather; cold temperature; coll. A. J. Grove. *L. G. B.*
355. **Bridgwater**. (1) At 50 ft. or less; larvae plentiful in a ditch in the town; 5, ix, 1900; obs. T. Strangeways-Pigg. *N. 1901.* (2) *T's. MS.*
356. **Chedzoy**, E. of Bridgwater. Ashford's Farm; cow-shed, cheese-room and cider-store; 6 ♀♀, with 3 *Culicines*, obtained in 10 mins.; 11.0 a.m.; 6, xi, 1917; fine weather; cold temperature; coll. A. J. Grove. *L. G. B.*
357. **Clevedon**. (1) In hotel; vi, 1904. *T's. MS.* (2) In cellar; 8, xii, 1917; obs. E. P. Hancock. *A. J. G. L. G. B.*
358. **Dunster**. 1 ♀; viii, 1908. *T's. MS.*
359. **Locking**, S.E. of Weston-super-Mare. Rall's Farm; cow-shed; 12 ♀♀, with numerous *Culicines*, obtained in 3 mins.; 2.30 p.m.; 7, xi, 1917; fine weather; cold temperature; coll. A. J. Grove. *L. G. B.*
360. **Middlezoy**, S.E. of Bridgwater. Gray Lake Farm (F. T. Tucker); cow-shed; 10 ♀♀, with numerous *Culicines*, obtained in 5 mins.; 11.50 a.m.; 6, xi, 1917; fine weather; cold temperature; coll. A. J. Grove. *L. G. B.*
361. **Minehead**. *T's. MS.*



362. **Moorlynych**, E. of Bridgwater. Fry's Farm; pig-sty and cider-store; 4 ♀ ♀, with numerous Culicines, obtained in 5 mins.; 12.25 p.m.; 6, xi, 1917; fine weather; cold temperature; coll'd. A. J. Grove. *L. G. B.*
363. **Old Winscombe**, N.W. of Axbridge. Cow-shed; 14 ♀ ♀, with numerous Culicines, obtained in 3 mins.; 3.30 p.m.; 7, xi, 1917; fine weather; cold temperature; coll'd. A. J. Grove. *L. G. B.*
364. **Polsham**, S.W. of Wells. At 50–100 ft.; larvae plentiful in a drain-ditch; 6, ix, 1900; obs. T. Strangeways-Pigg. *N. 1901.*
365. **Porlock**. (1) *T's. MS.* (2) Porlock Weir; ♀ ♀; viii, 1908. *T's. MS.*
366. **Staplegrave**, N.W. of Taunton. With *Culex pipiens*; there were over 80 on the ceiling of a living-room; no stagnant water anywhere near, and no one in the house was bitten; 1 ♂, rec. 5, x, 1917; coll'd. Edward A. B. Poole; det. W. D. L. *L. G. B.*
367. **Sutton Mallet**, E. of Bridgwater. A. Fry's Farm; stable and fowl-pen; 11 ♀ ♀, with numerous Culicines, obtained in 5 mins.; Anophelines were quite numerous in the stable; 12.50 p.m.; 6, xi, 1917; fine weather; cold temperature; coll'd. A. J. Grove. *L. G. B.*
368. **Taunton**. (1) At 50–100 ft.; larvae plentiful in mill backwater; 5, ix, 1900; obs. T. Strangeways-Pigg. *N. 1901.* (2) *T's. MS.*
369. **Uphill**, S. of Weston-super-Mare. Counsell's Farm; store-shed; 8 ♀ ♀, with 6 Culicines, obtained in 3 mins.; 4.50 a.m.; 7, xi, 1917; fine weather; cold temperature; coll'd. A. J. Grove. *L. G. B.*
370. **Webbington**, W. of Axbridge. A farm; fodder-shed; 1 ♀, with numerous Culicines, obtained in 5 mins.; 4.10 p.m.; 7, xi, 1917; fine weather; cold temperature; coll'd. A. J. Grove. *L. G. B.*
371. **Wells**. ♀ ♀ and larvae common; 1907. *T's. MS.*
372. **Weston-super-Mare**. (1) At 50–100 ft.; many larvae in a pond; 5, ix, 1900; obs. T. Strangeways-Pigg. *N. 1901.* (2) Common; viii and ix, 1909 and 1912. *T's. MS.* (3) Hofton, Uphill Road; 2 specimens recorded by Dr. Savage; per A. J. Grove. *L. G. B.*
373. **Westonzoyland**, S.E. of Bridgwater. Pool Farm; cow-shed; 5 ♀ ♀, with numerous Culicines, obtained in 5 mins.; 11.25 a.m.; 6, xi, 1917; fine weather; cold temperature; obs. A. J. Grove. *L. G. B.*
374. **Yeovil**. (1) At 100–200 ft.; larvae fairly numerous in a drain-ditch; 7, ix, 1900; obs. T. Strangeways-Pigg. *N. 1901.* (2) *T's. MS.*

## STAFFORDSHIRE.

- 374a. **Wood Eaton Manor**, S.W. of Stafford. ♀ in farm building; obs. R. F. L. Burton. *A. J. G. L. G. B.*

## SUFFOLK.

375. **Aldeburgh**. *T's. MS.*
376. **Bawdsey**, S.W. of Orford. Recorded by Claude Morley, 1911, *The Victoria History of the Counties of England: Suffolk*, vol. i, p. 136. Also from the following:—377 **Blakenham**, 378 **Bury**, 381 **Halesworth**, 384 **Newbourne**, 385 **Newmarket**, 387 **Southwold**, and 388 **Wickham Market**. *H. S.*
377. **Blakenham**, N.W. of Ipswich. (1) See under 376 Bawdsey. (2) At 50 ft. or less: larvae plentiful in deep, slowly-flowing clear water of R. Orwell, alongside the mill, amongst algae near the bank; 28, vii, 1900; obs. G. H. F. Nuttall. *N. 1901.* (3) *T's. MS.*

378. **Bury St. Edmunds.** (1) See under 376 Bawdsey. (2) At 100 ft. or less; larvae very plentiful in alga-containing ditches, near station, on the right, coming from Cambridge; 28, vii, 1900; obs. G. H. F. Nuttall. *N. 1901.* (2) *T's. MS.*
379. **Eye.** 1 ♀; ix, 1900. *T's. MS.*
380. **Felixstowe.** (1) Near Felixstowe ferry, almost at sea-level: (a) a few larvae, with *Culex*-larvae, in the dirty water of a small pool containing algae; (b) many larvae in clear ditches with *Spirogyra*, near R. Deben; 29, vii, 1900; obs. G. H. F. Nuttall. *N. 1901.* (2) *T's. MS.*
381. **Halesworth.** (1) See under 376 Bawdsey. (2) At 50 ft. or less; larvae in ditches containing *Spirogyra*; 4, ix, 1900; obs. G. H. F. Nuttall. *N. 1901.* (3) *T's. MS.*
382. **Ipswich.** ♀; xi, 1912. *T's. MS.*
383. **Lowestoft.** *T's. MS.*
384. **Newbourne, E. of Ipswich.** (1) See under 376 Bawdsey. (2) Buckleston's Mill, near Newbourn; at 50 ft. or less; larvae numerous in clear, deep, slowly-flowing water of mill-pond; 29, vii, 1900; obs. G. H. F. Nuttall. *N. 1901.* (3) *T's. MS.*
385. **Newmarket.** (1) See under 376 Bawdsey. (2) At 200 ft. or less: each year in collector's house; 1, i, to 27, xii, 1899; cold. Verrall. *N. 1901.* (3) *T's. MS.* (4) 4, ii, and 27, iii, on window; 14, iv; 19, ix; 19, xii, and 27, xii; inf. J. E. Collin. *H. S.* (5) 1 ♀; 1, i, 1880; cold. G. H. Verrall. *British Museum Collection.*
386. **Saxmundham.** *T's. MS.*
387. **Southwold.** (1) See under 376 Bawdsey. (2) Imagines emerged, 28, viii, 1917, from larvae found in Salt Creek; obs. Mrs. A. Macdonald; det. conf. Dr. G. A. K. Marshall. *H. S.* (See (5).) (3) At 50 ft. or less; several times in bedrooms during the night; 1, viii, 1900; obs. Morley. *N. 1901.* (4) *T's. MS.* (5a) Salt Creek; a permanent muddy swamp, where numerous excavations have been made, in which water collects and small fishes are plentiful; at the town end of the swamp are several wide and very shallow pools, in one of which a few small and very young larvae were found; (5b) between the footpath (running between Salt Creek and Southwold Common) and the deep pools above-mentioned is a series of quite small, shallow holes, overhung by long grass and containing a little grass and *Spirogyra*; larvae clustered together on the shady side of the pool, and a larger number of *Culicine* larvae found everywhere, apparently indifferent to light or shade; pupae also found—these were very active, and buried themselves in the mud on the slightest disturbance, remaining on the bottom much longer than the larvae; in both (5a) and (5b) the water was clear and very slightly brackish; houses are on the edge of the swamp; 24–27, viii, 1917; obs. Mrs. A. Macdonald. *A. J. G. L. G. B.*
388. **Wickham Market, N.E. of Ipswich.** (1) See under 376 Bawdsey. (2) At 50 ft. or less; larvae in ditches containing *Spirogyra*; 4, ix, 1900; obs. G. H. F. Nuttall. *N. 1901.* (3) *T's. MS.*
389. **Woodbridge.** ix, 1907. *T's. MS.*

#### SURREY.

390. **Albury, E. of Guildford.** *T's. MS.*
391. **Ash Vale, E. of Aldershot, Hants.** (1) Woodstock Cottage, Michett Road; scullery; 2 ♀♀, with 6 *Culicines*, obtained in 15 mins.; 1.0 p.m.; ii, ix, 1917; fine, sunshiny weather; hot temperature;

- collid. A. J. Grove. *L. G. B.* (2, a) Duke of Cambridge's House; cellar on ground floor; 4, with 17 *Culicines* (present in enormous numbers), obtained in 10 mins.; 11.0 a.m.; (b) Brookside, Wesley Road; pig-sty; 10, with 11 *A. bifurcatus* and 2 *Culicines*, obtained in 15 mins.; 1.0 p.m.; both on 12, ix, 1917; collid. A. J. Grove. *L. G. B.*
392. **Badshot Lea**, N.E. of Farnham. Robbin's Farm. (a) S.W. side of cow-shed; 5 ♀♀, with 3 ♀♀ *A. bifurcatus* and 10 *Culicines*, obtained in 15 mins.; 11.45 a.m.; (b) on N.E. side of cow-shed; 3 ♀♀, with 1 ♀ *A. bifurcatus* and 9 *Culicines*, obtained in 15 mins.; 12.0 noon; both on 6, ix, 1917; cloudy weather; warm temperature; (c) S.W. side of cow-shed; 4 ♀♀ obtained in 5 mins.; 11.45 a.m.; 28, xi, 1917; fine weather; cold temperature; all collid. A. J. Grove. *L. G. B.*
393. **Chertsey**. (1) At about 40 ft.; 4 larvae found after a long search along grassy, marshy margin of a little backwater of Thames; 25, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
394. **Chobham**, N.W. of Woking. (1) At 100–200 ft.; larvae fairly numerous in a small pond—"The Springs"—situated in a large expanse of heather, with small rushes and moss on the bank, and with water covered with brown floating weed; none found in similar "Gracious Pond,"  $\frac{1}{2}$  m. away; 21, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
395. **Claygate**, S.E. of Esher. Recorded by Lt.-Col. S. P. James, I.M.S. *A. J. G. L. G. B.*
396. **Dorking**. *T's. MS.*
397. **Epsom**. Recorded by Lieut.-Col. S. P. James, I.M.S. *A. J. G. L. G. B.*
398. **Esher**. (1) At 48 ft.; common; iv, 1888; obs. Theobald. *N. 1901* (2) *T's. MS.*
399. **Farnham**. *T's. MS.*
400. **Frensham**, S. of Farnham. *T's. MS.*
401. **Frimley**, N. of Aldershot, Hants. *T's. MS.*
402. **Godalming**. (1) At 200 ft. or less; 1 ♀; 1900; obs. Theobald. *N. 1901.* (2) *T's. MS.* (3) Peperharrow Road; 1 ♀; rec. 26, x, 1917; collid. O. H. Latter; det. W. D. L. *P. S.*
403. **Guildford**. *T's. MS.*
404. **Hale**, N.E. of Farnham. (1) Baker's Farm; (a) cow-sheds; 11 ♀♀, with 17 *Culicines*, obtained in 20 mins.; 11.45 a.m.; (b) piggery; 1 ♀, with 1 *Culicine*, obtained in 3 mins.; 11.45 a.m.; (c) piggery; 1 ♀, with 3 *Culicines*, obtained in 5 mins.; 11.55 a.m.; all three on 13, ix, 1917; cloudy, showery weather; cool temperature; (d) cow-shed; 13 ♀♀ obtained in 5 mins.; 11.0 a.m.; 29, xi, 1917; fine weather; cold temperature; all collid. A. J. Grove. *L. G. B.* (2) Hale Place Farm; cow-sheds; 1 ♀, with 9 *Culicines*, obtained in 10 mins.; 12.15 p.m.; 13, ix, 1917; cloudy, showery weather; cool temperature; collid. A. J. Grove. *L. G. B.*
405. **Heath End**, N.E. of Farnham. White House; cellar; 1 ♀ obtained in 5 mins.; 10.0 a.m.; 29, xi, 1917; fine weather; cold temperature; collid. A. J. Grove. *L. G. B.*
406. **Kingston-on-Thames**. (1) At 50 ft. or less; abundant; iv, 1887; obs. Theobald. *N. 1901.* (2) *T's. MS.*
407. **London, S.E., Denmark Hill**. (1) At 50 ft. or less; imago caught; 23, x; obs. Verrall. *N. 1901.* (2) *T's. MS.*



408. **Peaslake**, S.E. of Guildford. (1) Greensand hills, near Leith Hill, at 407 ft.; a few larvae and pupae found in little, rapid, grassy-margined, clear stream at a roadside in the village; 23, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
409. **Weybridge**. (1) At 38–200 ft.; a few larvae along the banks of the Thames opposite Docket Point; also, in fair numbers, at Weybridge Brickfields in St. George's Hills, in a little puddle in clay, with sparse vegetation about a fallen branch; 1 in house on the Common; 25, ix, 1900; obs. L. Cobbett. *N. 1901.* *T's. MS.*
410. **Wisley**, S. of Byfleet. (1) At 100 ft. or less; larvae fairly numerous in a small pond at the head of Hut Pond; water covered with brown floating weed; 20, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
411. **Witley**, S.W. of Godalming. Royal Ponds; 1 ♀; rec. 25, x, 1917; coll. O. H. Latter; det. W. D. L. *P. S.*

# SUSSEX.

412. **Angmering**, S.E. of Arundel. Angmering Ponds; 1 ♂; 25, viii, 1907; coll. Rev. A. C. Eaton. *British-Museum Collection.*
413. **Arundel**. 1 ♀ sent; i, 1899. *T's. MS.*
414. **Ashdown Forest**. viii, 1904. *T's. MS.*
415. **Battle**. *T's. MS.*
416. **Bexhill**. ♀ ♀; in town; ix, 1889, 1901 and 1911. *T's. MS.*
- 416a. **Bexley Hill**, N.E. of Midhurst. 1 ♀; hibernating in a cow-shed; 3, xi, 1917; obs. R. F. L. Burton. *A. J. G. L. G. B.*
417. **Bodiam** (Bodyham), N.W. of Rye. Common in the 'eighties. *T's. MS.*
418. **Bognor**. Common generally. *T's. MS.*
419. **Camber**, S.E. of Rye. 2 ♀ ♀ and 1 ♂, viii, 1909. *T's. MS.*
420. **Coleman's Hatch**, S.W. of Hartfield, S.E. of East Grinstead. Larvae in pools and water receptacles—quite a pest. *T's. MS.*
421. **Crowborough**. (1) ♀; 1916. *T's. MS.* (2) ♂; 31, vii, 1912; coll. F. J. H. Jenkinson; det. conf. F. W. Edwards; Cambridge University Museum Collection. *H. S.* (3) Common, and biting; obs. F. J. H. Jenkinson. *H. S.*
422. **Eastbourne**. 1 ♀; 1885. *T's. MS.*
423. **Friday Street**, N. of Horsham. (1) At 500 ft.; larvae fairly numerous along the margins of a large pond; 23, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
424. **Guestling**, S.W. of Winchelsea. See J. H. A. Jenner and Rev. E. N. Bloomfield, 1905, *The Victoria History of the Counties of England: Sussex*, vol. i, p. 213; quoted from Hastings and St. Leonards Nat. Hist. Soc.'s list. *H. S.*
425. **Hastings**. (1) Often found, commonly behind town; larvae in barrels. *T's. MS.* (2) At 100 ft. or less; iv and ix, 1883 to 1890; obs. Theobald. *N. 1901.*
426. **Horsham**. ♀; vi, 1912. *T's. MS.*
427. **Laughton**, E. of Lewes. (1) At 100 ft. or less; 17, iv; obs. Verrall. *N. 1901.* (2) *T's. MS.* (3) 17, iv; obs. J. E. Collin. *H. S.*
428. **Lewes**. (1) At 100 ft. or less; 2 and 8, ii; 15, x; and 6, xi; obs. Verrall. *N. 1901.* (2) *T's. MS.* (3) 8, ii; and 6, xi; obs. G. H. Verrall; see also J. H. A. Jenner and Rev. E. N. Bloomfield, 1905,

- The Victoria History of the Counties of England: Sussex, vol. i, p. 213. *H. S.*
429. **Malling**, N.E. of Lewes. 15, x; obs. G. H. Verrall; see J. H. A. Jenner and Rev. E. N. Bloomfield, 1905, The Victoria History of the Counties of England: Sussex, vol. i, p. 213. *H. S.*
430. **Patching**, N.W. of Worthing. Patching Pond; 1 ♀; 9, ix, 1907; coll'd. Rev. A. E. Eaton. *British Museum Collection.*
431. **Pevensey**. *T's. MS.*
432. **Polegate**, N. of Eastbourne. Common in 1882, 1883 and 1884, also vii, 1886. *T's. MS.*
433. **Rudgwick**, N.W. of Horsham. vi, 1911, and on other occasions, indoors. *T's. MS.*
434. **Rye**. (1) On many occasions. *T's. MS.* (2) At 50 ft. or less; v, 1885; obs. Theobald. *N. 1901.*
435. **Slinfold**, W. of Horsham. At 100 ft. or less; larvae found in moderate numbers in most streams of the district, but more in the main river; 3, ix, 1901; obs. Stanley Child; det. G. H. F. Nuttall. *N. 1905.*
436. **Three Bridges**. (1) *T's. MS.* (2) 13, vii; obs. J. E. Collin. *H. S.*
437. **West Grinstead**, S. of Horsham. *T's. MS.*
438. **Winchelsea**. On many occasions. *T's. MS.*
439. **Worthing**. Common generally. *T's. MS.*

## WARWICKSHIRE.

440. **Warwick**. *T's. MS.*

## WESTMORLAND.

441. **Kendal**. ♀ ♀ sent; ix, 1907. *T's. MS.*

## WORCESTERSHIRE.

442. **Evesham**. viii, 1902; viii, 1912; ii, 1912. *T's. MS.*
443. **Hanley Castle**, N.W. of Upton-on-Severn. "Taken from an old farmhouse with a large pool of water near. The doctor who obtained these specimens tells me he has had a case of intermittent fever, apparently resembling a type of malaria, at this house. He has some difficulty in explaining any cause"; 1 ♀; rec. 8, x, 1917; coll'd. J. S. Cowley; det. W. D. L. *L. G. B.*
444. **Stourport**. vii, 1909; viii, 1907. *T's. MS.*
445. **Worcester**. In an hotel; viii, 1912. *T's. MS.*

## YORKSHIRE.

446. **Bubwith**, E. of Selby. 2 ♂ ♂ and 9 ♀ ♀; 7 (and succeeding days), xi, 1917; coll'd. W. J. Fordham. *A. J. G. L. G. B.*
447. **Buckton**, N. of Bridlington. (1) At 250 ft.; larvae, with *Culex*-larvae; both numerous at the head of a large pond with grassy, horse-trodden margin; 31, viii, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
448. **Cayton**, S. of Scarborough. (1) At 140 ft.; larvae in a stone trough of slowly-running water, with algae; 8, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*

449. **Cayton Bay**, S.E. of Scarborough. (1) At 50 ft.: larvae, with *Culex*-larvae, in pond situated half-way down a mud cliff; small, horse-trodden pools, with grass growing up through the water, and no algae, such as *Spirogyra*, *Ulva*, etc., noticeable; 29, viii, 1900; obs. L. Cobbett. *N. 1901*. (2) *T's. MS.*
450. **East Heslerton**, N.E. of New Malton. (1) At 100-200 ft.: larvae in little village pond in middle of road, with no weed or grass; 4, vii, 1900; obs. L. Cobbett. *N. 1901*. (2) *T's. MS.*
451. **Filey**. (1) 1, near Filey; ix, 1896; obs. Theobald. *N. 1901*. (2) *T's. MS.*
452. **Flamborough Head**. (1) Larvae in horse-trodden, grass-bordered ponds on the top of cliffs of chalk covered with glacial drift, between Dane's Dyke and the lighthouse; (a) many larvae in a small pond near the cliff edge,  $\frac{1}{2}$  m. N. of lighthouse; (b) many in roadside pond, 1 m. N. of Flamborough village; (c) a roadside pond inside Dane's Dyke; 31, viii, 1900, and 5, ix, 1900; obs. L. Cobbett. *N. 1901*. (2) *T's. MS.*
453. **Halifax**. ♀ ♀; viii and ix, 1889. *T's. MS.*
454. **Harwood Dale**, N.W. of Scarborough. (1) At over 200 ft.: larvae, with *Culex*-larvae, in a pond by a stream in an upland grassy valley; 30, viii, 1900; obs. L. Cobbett. *N. 1901*. (2) *T's. MS.*
455. **Luddenden Foot**, W. of Halifax. viii and ix, 1889. *T's. MS.*
456. **Scarborough**. *T's. MS.*

#### WALES.

457. **Barmouth**. *T's. MS.*
458. **Beddgelert**. *T., 1901*, p. 193.
459. **Cardiff**. ♀ ♀, in house; 18, xi, 1917, at 12.0 (noon); 19, xi, 1917; 23, xi, 1917, at 10.30 p.m.; 1, xii, 1917, at 7.0 p.m.; rec. by National Museum of Wales; obs. J. Davy Dean. *A. J. G. L. G. B.*
460. **Criccieth**. (1) At 50 ft. or less; a few; ix, 1895; obs. Theobald. *N. 1901*. (2) *T's. MS.* (3) *T. 1901*, p. 193.
461. **Dolgelley**. *T's. MS.*
462. **Machynlleth**. *T's. MS.*
463. **Oxwich**, Gower peninsula. (1)  $\frac{1}{4}$  m. from Oxwich village; at sea-level; one larva in a stream running through a marsh and containing many prawns; 25, viii, 1900; obs. E. Gardner. *N. 1901*. (2) *T's. MS.*
464. **Tal-y-llyn**, S. of Dolgelley. *T's. MS.*
465. **Yn-ys-las**, Cardiganshire, S.W. of Machynlleth. ♀ from farm building—"a rather different specimen, darker and harder-looking"; obs. R. F. L. Burton. *A. J. G. L. G. B.*

#### SCOTLAND.

**Torphins**, Aberdeenshire, W. of Aberdeen and N.E. of Aboyne. (1) The following records by M. J. Wright, 1901, *British Medical Journal*, vol. i, pp. 882-3:—*A. maculipennis* and *A. bifurcatus* and a few insects closely resembling *A. bifurcatus*, but of smaller size, probably *A. plumbeus*; viii, 1900, to iv, 1901. These and *Theobaldia annulata*, *Culex pipiens*, and *Ochlerotatus nemorosus*, taken at Deeside, especially at Torphins; plentiful from mid-viii to mid-x, and attacked man readily and persistently; *A. bifurcatus* and *O. nemorosus* were the most troublesome; the favourite feeding-time was late evening; but *C. pipiens* and *A. bifurcatus* occasionally



started on dull days in shady places in woods; in spite of the cold towards the end of October, certain kinds continued biting freely out of doors at sunset; no adult *A. maculipennis* was taken on the wing, but all bred from larvae; observations are also made on the duration of life of larvae and the effect of temperature on them. *H. S.* (2) At 300 ft. or less; specimens in British Museum; coll'd. Dr. M. J. Wright. *N. 1901.* (3) 1 ♂; coll'd. M. J. Wright. *British Museum Collection.*

#### IRELAND.

**Ballinrobe**, Co. Mayo. A number invaded a dwelling-house and bit the inmates; several specimens were sent to Prof. G. H. Carpenter between 1 and 7, vii, 1917, and det. him. *H. S.*

**Belfast**. 1 ♂ and a number of ♀♀, bred by Capt. A. Macdonald, ix, 1917, and sent to Dr. G. A. K. Marshall. *H. S.*

**Holywood**, Co. Down, N.E. of Belfast. At 200 ft. or less; coll'd. A. H. Haliday (see Entomological Magazine, 1833, vol. i, p. 148). *N. 1901.*

### ANOPHELES BIFURCATUS (Linnaeus).

Numbers on the map referring to this species are within blue V's.

#### BEDFORDSHIRE.

466. **Biggleswade**. Common; 1889 to 1892. *T's. MS.*

467. **Caldecote**, N.W. of Biggleswade. Common, and annoying out of doors. *T's. MS.*

#### CAMBRIDGESHIRE.

468. **Baitsbite**, N.E. of Cambridge. Meadows near Baitsbite Lock; ♂; 23, vii, 1910; coll'd. Hugh Scott; det. F. W. Edwards; Cambridge University Museum Collection. *H. S.*

469. **Burwell**, N.W. of Newmarket, Suffolk. (1) At 50 ft. or less; 5, v; obs. Verrall. *N. 1901.* (2) 6, vi; obs. J. E. Collin. *H. S.*

470. **Cambridge**. (1) Mr. F. J. H. Jenkinson, who gets all three species of *Anopheles* in his garden, states that specimens which bite one in the garden on summer evenings from 6–7 p.m. are usually of this species. (Contrast his observations on *A. maculipennis*.) (2) Cambridge town or immediate vicinity; ♀; 22, v, 1901; coll'd. F. J. H. Jenkinson; det. conf. F. W. Edwards; Cambridge University Museum Collection. *H. S.* (3) See under *Anopheles maculipennis*, 17 Cambridge (9). *N. 1905.*

471. **Grantchester**. (1) At 50–100 ft.; larvae in a tub; iv, 1905; obs. N. D. F. Pearce; det. G. H. F. Nuttall. *N. 1905.* (2) See also under *Anopheles maculipennis*, 17 Cambridge (9). *N. 1905.*

472. **Wicken**, N.E. of Cambridge. i, v; obs. J. E. Collin. *H. S.*

#### CHESHIRE.

473. **Aldford**, S. of Chester. (1) At 100 ft. or less; larvae in one pond only; 9, ix, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*

474. **Holmes Chapel** (Church Hulme). Larvae in a small river; 28, xi, 1916; five larvae, fed under laboratory conditions, pupated 30, iv,

- to 1, v, 1917; the first imago (a ♂) emerged 4 or 5, v, 1917; obs. H. Tetley; per Dr. A. D. Imms. *H. S.*
475. **Liverpool** district. See under Lancashire, 530 Liverpool district.
476. **Mickle Trafford**, N.E. of Chester. (1) At 100 ft. or less; larvae in roadside ditch; 9, ix, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*

#### CORNWALL.

477. **Falmouth**. 1 ♀; 1909. *T's. MS.*
478. **Fowey**. viii, 1909. *T's. MS.*
479. **Padstow**. ♀, ix, 1904; and ♂, ix, 1909; coll'd. C. G. Lamb, M.A.; det. conf. F. W. Edwards; Cambridge University Museum Collection. *H. S.*
480. **Penzance**. 1 ♂ and 1 ♀; 17, vii, 1901; coll'd. F. W. Terry. *British Museum Collection.*
481. **Truro**. vii and viii, 1909. *T's. MS.*
482. **West of Cornwall**. See Prof. James Clark, 1906, *The Victoria History of the Counties of England: Cornwall*, vol. i, p. 229; obs. C. W. Dale. *H. S.*

#### DERBYSHIRE.

483. **Buxton**. In and near town; ♀ ♀; viii and ix, 1884 and 1887. *T's. MS.*
484. **Derby**. Near the town; ♀ ♀ plentiful; 1900. *T's. MS.*
485. **Repton**, S.W. of Derby. 1 ♀; rec. 15, x, 1917; coll'd. H. C. Hayward; det. W. D. L. *P. S.*

#### DEVONSHIRE.

486. **Axminster**. (1) At 50-100 ft.; larvae fairly numerous in a roadside pool; 2, ix, 1900; obs. T. Strangeways-Pigg. *N. 1901.* (2) *T's. MS.*
487. **Exmouth**. Bitten when fishing; 1889. *T's. MS.*
488. **Falla Pit**, N.E. of Kingsbridge. A few; vii, 1906. *T's. MS.*
489. **Princetown**. vii, 1904. *T's. MS.*
490. **Sidmouth**. Near river; common; vii, 1893. *T's. MS.*
491. **Slapton**, S.W. of Dartmouth. 8, ix, 1917; obs. J. E. Collin. *H. S.*
492. **Slapton Ley**, S.E. of Slapton, S.W. of Dartmouth. (1) At 200-300 ft.; 8, ix, 1917; obs. Verrall. *N. 1901.* (2) (Marked as "Slapton.") *T's. MS.*
493. **Tor Cross**, S.E. of Kingsbridge. (1) On hotel window; 1 ♀; 6, ix, 1903; coll'd. Lt.-Col. Yerbury. *British Museum Collection.* (2) 2 ♀ ♀; biting; 24, iv, 1909. *British Museum Collection.*
494. **Torquay**. Mary Church, Torquay; larvae, i, 1887; and imagines in vii. *T's. MS.*
495. **Totnes**. On many occasions. *T's. MS.*

#### ESSEX.

496. **Epping Forest**. Col. A. Alcock has taken specimens here (letter, 20, v, 1917). *H. S.*
- Tilbury** district (includes **Coal House**, **Fort Victoria**, **Pitsea** and **Thames Haven**). Occurs, but not so commonly as does *A. maculipennis*. *W. O.*

## HAMPSHIRE.

497. **Aldershot.** (a) ♀ ♀ rec. alive, 16, x, 1917; (b) larvae rec. alive, 31, x, 1917; both coll'd. Capt. A. Parsons, R.A.M.C.; det. W. D. L. **Bournemouth** and district. (1) Larvae in water tubs of a nursery-garden at Branksome; ii, 1910; det. E. E. Austen; (2) Larvae in ditches at Christchurch, Hurn, Ripley and Holdenhurst, in the earlier months of the year; obs. H. J. Waddington; per Sir E. Ray Lankester. [Note:—This record was received too late for insertion in the map.]
498. **Brockenhurst.** Many; viii, 1914. *T's. MS.*
499. **Lymington.** (1) At 100 ft. or less; 22, vi; obs. Verrall. *N. 1901.* (2) 1 ♂ and 2 ♀ ♀; 1905; coll'd. Rev. A. E. Eaton. *British Museum Collection.* (3) 22, vi; obs. J. E. Collin. *H. S.*

## HEREFORDSHIRE.

500. **Ledbury.** Many; vi and vii, 1907; and vii, 1903. *T's. MS.*
501. **Ross.** Common; viii, 1906. *T's. MS.*
502. **Symond's Yat.** Common; viii, 1906. *T's. MS.*
503. **Tarrington, E. of Hereford.** (1) At 200–250 ft.; 1 ♀; “probably on damp, marshy ground”; 1, v, 1909; obs. Yerbury. *N. 1901.* (2) *T's. MS.*

## HERTFORDSHIRE.

504. **Bricket Wood, N.E. of Watford.** 2 ♀ ♀; 20, iv, 1912; coll'd. F. W. Edwards. *British Museum Collection.*
505. **Radwell, N. of Letchworth.** ♀; by lake; vi, 1917; obs. F. W. Edwards. *A. J. G. L. G. B.*

## HUNTINGDONSHIRE.

506. **Alconbury Hill, N. of Huntingdon.** (1) At 100 ft. or less; ♂ and ♀ caught by lamp-light in house and sent us; 12, viii, 1900; obs. Garrod; det. Theobald. *N. 1901.* (2) Probably same locality marked as “Huntingdon.” *T's. MS.*
507. **Great Staughton, S.E. of Kimbolton.** Common from 1887 to 1890. *T's. MS.*
508. **Kimbolton.** Larvae and imagines common. *T's. MS.*
509. **St. Neots.** Common, from 1887 to 1890. *T's. MS.*
510. **Swineshead, S.W. of Kimbolton.** Often, from 1887 to 1890. *T's. MS.*
511. **Wood Walton Fen, W. of Ramsey.** 3 ♂ ♂ and 2 ♀ ♀; bred from larvae; 13–15, iv, 1914; coll'd. F. W. Edwards. *British Museum Collection.*

## KENT.

512. **Bleau, N.W. of Canterbury.** On many occasions. *T's. MS.*
513. **Charing, N.W. of Ashford**
514. **Chartham, S.W. of Canterbury.**
515. **Chilham, S.W. of Canterbury.**
- { Often found; sometimes very annoying; not so plentiful as *A. maculipennis*; “bad” near pieces of stagnant water and lakes; larvae also taken. This information also applies to 517 **Eastwell**, 527 **Westwell**, 528 **Willesborough**, and 529 **Wye.** *T's. MS.*



516. **Deal.** One; vii, 1912. *T's. MS.*
517. **Eastwell,** N. of Ashford. See information under 513 Charing.
518. **Faversham.** 2 ♀♀ and 1 ♂; vi, 1907. *T's. MS.*
519. **Gravesend.** One mile below Gravesend. Bred from larvae from a large clay-pit in a meadow inside the embankment wall on S. side of R. Thames; the pit overflows into some grounds, forming a small pool; larvae present in large numbers, both Culicine and Anopheline; a small, fortuitous puddle within 60 yds. of the pool was also infested with Anophelines; 3 ♂♂ and 3 ♀♀ rec. 5, x, 1917; coll'd. W. M. Willoughby; det. W. D. L. *L. G. B.*
520. **Lydd,** S.W. of Hythe. (1) Many; iv and viii, 1915 and 1917. *T's. MS.* (2) 2 larvae rec. from Capt. A. Macdonald, per Dr. G. A. K. Marshall; 11, iii, 1918; det. W. D. L.
521. **Lympne,** S.W. of Hythe. Below castle and in houses; vi, 1913. *T's. MS.*
522. **Minster,** W. of Ramsgate. Common in 1904. *T's. MS.*
523. **Pegwell Bay.** Several; vi, 1910. *T's. MS.*
524. **Romney Marshes.** (1) Always present. *T's. MS.* (2) Col. A. Alcock has taken specimens here (letter, 20, v, 1917). *H. S.* (3) In Romney Marshes *A. maculipennis* is the prevailing species; between x, 1917, and iii, 1918, only one specimen of *A. bifurcatus* obtained (reared from pupa). *W. O.*
525. **Sandwich.** (1) New Street; Dr. Kerswill's surgery; 1 ♀, with 1 ♀ *Anopheles maculipennis* and Culicines, obtained in 2 mins.; 6.30 p.m. (dark); 28, ix, 1917; fine weather; cool temperature; coll'd. A. J. Grove. *L. G. B.* (2) Near Woodnesborough Road; E. Lawrence's cow-shed; (a) one damaged specimen, probably of this species, with 11 *Anopheles maculipennis* and 8 Culicines, obtained in 5 mins.; 2.45 p.m.; (b) 1 ♀, with 2 *A. maculipennis* and Culicines, obtained in 5 mins.; 3.15 p.m.; both on 29, ix, 1917; fine weather; warm temperature; obs. A. J. Grove. *L. G. B.* (3) Hibernating larvae in ditches, but no imagines seen; iii, 1918. *W. O.*
526. **Tonbridge.** Often. *T's. MS.*
527. **Westwell,** N. of Ashford. See information under 513 Charing.
528. **Willesborough,** S.E. of Ashford. See information under 513 Charing.
529. **Wye,** N.E. of Ashford. None seen this year, so far [21, ix, 1917]; in houses it occurs on the ground floor, while *Anopheles maculipennis* occurs on the first floor [cf. remarks on this point under 470 Cambridge, 545 Oxford, and 550 Longner Hall]. Other information as under 513 Charing. *T's. MS.*

#### LANCASHIRE.

530. **Liverpool** district. "Prof. Newstead informed me (4, v, 1917) that *Anopheles bifurcatus* is common in the low-lying marshes on the Cheshire side of the Mersey, and can generally be got in its various stages in numbers for laboratory work. It is not nearly so easy to find on the Lancashire side. *A. maculipennis* and *A. plumbeus* are relatively scarce in the district." *H. S.*
531. **St. Anne's-on-the-Sea.** ix, 1912; and 3, x, 1912; coll'd. J. H. Ashworth, but the determination was not confirmed by anyone and the specimens were not kept; per Herbert Bury (Lomber Hey, High Lane, Cheshire). *H. S.*

## LINCOLNSHIRE.

532. **Cadney**, S.E. of Brigg. (1) At 50 ft. or less; 1 ♀; v, 1898; obs. Grimshaw. *N. 1901.* (2) *Ts. MS.*
533. **Gainsborough**. (1) Near Gainsborough, at 50 ft. or less; larvae very numerous in roadside ditch between Morton and Walkerith Ferry, with no algae, but *Lemna*; one *Culex*-larva also obtained; 12, viii, 1900; obs. G. H. F. Nuttall. *N. 1901.* (2) *Ts. MS.*
534. **Panton**, N.W. of Wragby. Common, 1906 and 1912. *Ts. MS.*
535. **Wragby**. Common, 1906 and 1912. *Ts. MS.*

## MIDDLESEX.

536. **Brentford**. Near Brentford (no further particulars); Col. Alcock, in letter, 20, v, 1917. *H. S.*
537. **Ealing**. 1 ♀, 9, viii, 1912; and 1 ♀, 15, ix, 1912; colld. H. Cam-pion. *H. S.*

## MONMOUTHSHIRE.

538. **Monmouth**. In a garden near the town; vii, 1907. *Ts. MS.*

## NORFOLK.

539. **Burlingham**, E. of Norwich. [Applies also to 540 **Horsey**, 541 **Potter Heigham**, and 542 **Wroxham**.] Imagines and larvae: see Sydney H. Long, 1902, "A preliminary list of the Mosquitoes of Norfolk"; Trans. Norfolk and Norwich Nat. Soc., vol. vii, p. 353; the result of observations spread over about 18 months. *H. S.*
540. **Horsey**, N.W. of Yarmouth. See under 539 Burlingham.
541. **Potter Heigham**, N.E. of Norwich. See under 539 Burlingham.
542. **Wroxham**, N.E. of Norwich. See under 539 Burlingham.

## NORTHAMPTONSHIRE.

543. **Newton**, N. of Kettering. 1 ♂; "some years ago"; obs. E. F. Wallis. *A. J. G. L. G. B.*

## NORTHUMBERLAND.

544. **Hexham**. 7, ix, 1909. *Ts. MS.*

## OXFORDSHIRE.

545. **Oxford**. (1) v and ix; the latter brood consists of smaller specimens than those of May; abundant; does not occur in houses [cf. 490 Cambridge, 506 Alconbury Hill, 521 Lympne, 529 Wye, and 550 Longner Hall], and bites viciously during the late afternoon until sunset; obs. A. H. Hamm, the result of observations and notes made during the last three years. *H. S.* (2) We have been very successful in locating the breeding-haunts of *Anopheles bifurcatus* in and around Oxford. (a) On 8, ix, we visited a small boggy piece of ground near Bayswater Mill, Headington, and the larvae and pupae were found quite plentifully in small depressions filled with surface water, and even the holes left by the hooves of cattle were found to contain numbers of larvae and pupae. During the whole time we were searching for the larvae, etc., the ♀♀ of this species were around us, biting most viciously (or attempting to bite) from

4 p.m. until 7 p.m. (summer time); large numbers of these were netted. (b) 15, ix, 1917; Hogley Bog; larvae and pupae in some abundance in small bog-holes; none found in the small stream running through the valley; no imagines met with, though we stayed until dark and netted a large number of Culicids. (c) 22, ix, 1918; Taylor's Pit, Shotover Hill; large numbers of larvae and pupae in clay-holes scattered about the pit and filled with surface water; a few ♀♀ biting, but not so viciously as on 8, ix; a fairly large swarm of ♂♂ observed at about 6 p.m., a number of which were netted for verification; (d) 29, ix, 1917; Taylor's Pit; many larvae and a few pupae; one or two imagines observed; (e) 20, x, 1917; Taylor's Pit; many larvae, but nearly all were small and could only recently have been hatched; no pupae or imagines. (f) 22, x, 1917; Mesopotamia, just below University Museum; between 1 and 2 p.m. tried a wide ditch running into the mill-stream, but could find no trace of larvae; also tried mill-stream, among the weeds along the margin, but none were found. If we might venture to summarise the results obtained in the short time we have so far devoted to investigating *Anopheles* in and around Oxford, it would appear that *A. bifurcatus* is the most abundant species, as it seems able to breed in any small hole in suitable localities. As we have seen no imagines during the last fortnight, but only an abundance of very small larvae, it looks as though this species hibernated in the larval state. We have still on hand a number of small larvae which we intend keeping during the winter as a test. We found the pupal stage quite short, averaging about six days in September and October; a few took about nine days before emerging. So far, this species has not been observed in houses. [See above, under (1).] From a supplementary report on *Anopheles* in Oxford, dated 22, x, 1917; obs. A. H. Hamm and H. Britten; per Dr. G. A. K. Marshall. (3) Marston Ferry; a permanent ditch of overflow water from the river, in swampy ground; water muddy, very little, except in hoof-marks; no fishes; numerous cattle present; houses within  $\frac{1}{2}$  m.; trees on river-bank; 5, ix, 1917; temp. of air 60·8 (at 9 p.m.); bright sunshine; obs. Mrs. A. Macdonald. *A. J. G. L. G. B.*

#### SHROPSHIRE.

546. **Attingham Park**, S.E. of Shrewsbury. ♀♀ biting, near the Tern River; obs. R. F. L. Burton. *A. J. G. L. G. B.*
547. **Betton**, S. of Shrewsbury. ♀♀ biting at Shomere Pool; obs. R. F. L. Burton. *A. J. G. L. G. B.*
548. **Calvington**, N.W. of Newport. ♂♂ swarming; obs. R. F. L. Burton. *A. J. G. L. G. B.*
549. **Eaton Mascot Hall**, S.E. of Shrewsbury. In the big wood: 1 ♀, biting; 11, xi, 1909; obs. R. F. L. Burton. *A. J. G. L. G. B.*
550. **Longner Hall**, S.E. of Shrewsbury. (1) 2 ♀♀; in garden; 24, v, 1909; cold. R. F. L. Burton. *British Museum Collection.* (2) Undoubtedly the commonest species of *Anopheles* here; for the whole summer (15, iv, to 11, xi) inhabits woods near ponds, ditches and streams, and bites men and cattle, day and night; it does not seem to vary in numbers from year to year [cf. *A. maculipennis*]; there are always large numbers; I have never had more than four biting at a time; it bites cows and calves near woods in summer, and occasionally comes indoors to bite [cf. 490 Cambridge, 506 Alconbury Hill, 521 Lympne, 529 Wye, and 545 Oxford (2)]; dog-mercury and nettles shelter it in summer, or heaps of fallen



tree-tops, as spruce or any thick stuff like it; I have never seen the ♀ hibernate; in early spring the ♂ ♂ swarm in the open spaces of woods, but come out in warmer, calm weather and swarm out in the fields and over ditches in lots up to twenty-five; in July it gets badly infested with a red parasite [a mite, *Trombidium*].

20, iv, 1910; ♂ ♂; swarming in quarry, at 7.0 p.m.

21, iv, 1907; ♂ ♂; " in sandstone quarry, at 5.30 p.m.

21, iv, 1907; ♂ ♂; " at withy-bed, at 7.0 p.m.

23, iv, 1909; ♂ ♂; " in sandstone quarry, at 5.30 p.m.

26, iv, 1910; ♂ ♂; " among quinces, at 6.45 p.m.

27, iv, 1910; ♀ ♀; biting in sandstone quarry, at 6.30 p.m.

3, v, 1909; ♂ ♂; swarming in quarry woods, at 6.15 p.m.

4, v, 1910; ♂ ♂; " in quarry, at 7.0 p.m.

6, v, 1908; ♂ ♂; " in sandstone quarry, at 6.45 p.m.

10, v, 1910; ♂ ♂; " at withy-bed, at 6.30 p.m.

11, v, 1906; ♂ ♂; " in sandstone quarry.

11, v, 1909; ♂ ♂; " in most of the woods.

15, v, 1910; ♂ ♂; " at withy-bed, at 6.55 p.m.

18, v, 1909; ♂ ♂; "

24, v, 1909; ♀ ♀; infested with larval *Trombidium*.

27, v, 1910; ♂ ♂; swarming in Severn Meadows, at 8.20 p.m.

28, v, 1909; ♂ ♂; in sandstone quarry.

4, vi, 1909; ♂ ♂; swarming in rookery.

6, vi, 1910; ♂ ♂; " in Severn Meadows, at 8.30 p.m.

11, vi, 1910; ♂ ♂; " in Severn Meadows.

16, vi, 1909; ♂ ♂; " in sandstone quarry.

19, vi, 1907; ♂ ♂; " by water-cress pit.

21, vi, 1910; ♂ ♂; " in Severn Meadows, at 8.30 p.m.;  
infested with *Trombidium*.

27, vi, 1909; ♂ ♂; swarming in most of the woods.

30, vi, 1909; ♂ ♂; " " "

30, vi, 1909; ♂ ♂; " in water-cress pit.

5, vii, 1909; ♂ ♂; " high up in fields by woods.

7, vii, 1910; ♂ ♂; " in Severn Meadows (20 taken in two  
sweeps of the net), at 9.0 p.m.

12, vii, 1906; ♂ ♂; swarming at end of sandy lane.

16, vii, 1910; ♂ ♂; " at withy-bed, at 8.20 p.m.

21, vii, 1908; ♂ ♂; "

21, vii, 1910; ♂ ♂; " at withy-bed, at 8.35 p.m.

26, vii, 1906; ♂ ♂; " by water-cress pit.

30, vii, 1910; ♂ ♂; " in Severn Meadows, at 8.30 p.m.

6, viii, 1910; ♂ ♂; " " " at 8.15 p.m.

22, viii, 1910; ♂ ♂; " " " at 7.15 p.m.

1, ix, 1910; ♂ ♂; " " " at 6.30 p.m.

6, ix, 1910; ♂ ♂; " at water-cress pit, at 6.35 p.m.; in-  
fested with *Trombidium*.

8, ix, 1909; ♂ ♂; swarming at end of sandy lane, at 6.30 p.m.

13, ix, 1909; ♂ ♂; " high up over bylet ditch.

14, ix, 1909; ♂ ♂; " over starch-house field.

21, ix, 1909; ♂ ♂; "

26, ix, 1909; ♂ ♂; " by water-cress pit.

28, ix, 1917; from *Mercurialis perennis*, in New Red Sandstone  
quarry, at 4.0 p.m.

29, ix, 1909; ♂ ♂; swarming in Severn Meadows and over bylet  
ditch.

30, ix, 1917; ♂ ♂; swarming in batches of 10, 17, 30, and smaller  
numbers, awaiting the arrival of a ♀, in low-lying meadows by  
the Severn, as soon as the sun had set.

- 2, x, 1909; ♂♂; swarming at withy-bed.  
 6, x, 1909; ♂♂; " at withy-bed, at 5.30 p.m.  
 10, x, 1917; 1 ♂: " in Severn Meadows, at 5.15 p.m.; fine  
 and cold (but a slight shower at 5.15 p.m.).  
 12, x, 1909; ♂♂; swarming at withy-bed.  
 12, x, 1917; 1 ♂ came out of wood.  
 17, x, 1917; 1 ♂ flying to and fro, awaiting ♀, near water-cress  
 pit, at 5.20 p.m.  
 18, x, 1909; ♂♂; swarming at withy-bed.  
 20, x, 1909; ♂♂; " " "  
 21, x, 1906; ♂♂; " " "

Notes by R. F. L. Burton, Esq., of Longner Hall, Shrewsbury, many of which are published in *T.* 1910, pp. 11 and 12; others from notes sent to the *British Museum* and to A. J. Grove, Esq., of the *L. G. B.*

551. **Market Drayton.** 2, viii, 1908. *T's. MS.*  
 552. **Shrewsbury.** On many occasions, near the town. *T's. MS.*

#### SOMERSETSHIRE.

553. **Bath.** A few, in vii. *T's. MS.*  
 554. **Cheddar.** Several, near valley; x, 1909. *T's. MS.*  
 555. **Clevedon.** Many; vi, 1904. *T's. MS.*  
 556. **Freshford,** S.E. of Bath. Obs. H. J. Charbonnier; see Lt.-Col. L. Blathwayt, 1906, *The Victoria History of the Counties of England: Somerset*, vol. i, p. 115. *H. S.*  
 557. **Monkton Combe,** S.E. of Bath. 2 ♀♀; rec. 18, x, 1917; colld. A. F. Kitching; det. W. D. L. *P. S.*  
 558. **Weston-super-Mare.** Common; viii and ix, 1909 and 1912. *T's. MS.*

#### SUFFOLK.

559. **Exning.** (1) 11, viii, and 22, ix; obs. J. E. Collin. *H. S.* (2) At 100 ft. or less; 11, viii; colld. Verrall. *N. 1901.* (3) *T's. MS.*  
 560. **Foxhall,** E. of Ipswich. (1) See Claude Morley, 1911, *The Victoria History of the Counties of England: Suffolk*, vol. i, p. 136. Applies also to 561 **Mildenhall** and 562 **Whersted.** *H. S.* (2) At 50 ft. or less; 1 ♂; swept from nettles on the side of a stagnant pool; 19, v, 1900; obs. Morley. *N. 1901.* (3) *T's. MS.*  
 561. **Mildenhall,** N.E. of Newmarket. (1) See under 560 Foxhall (1). (2) 8, ix; obs. J. E. Collin. *H. S.* (3) At 50 ft. or less; 8, ix; obs. Verrall. *N. 1901.* (4) *T's. MS.*  
 562. **Whersted,** S. of Ipswich. See under 560 Foxhall (1).

#### SURREY.

563. **Ash Vale,** E. of Aldershot, Hants. (a) Canal Villas, near Basingstoke Canal; scullery; 1, with 1 Culicine, obtained in 5 mins.; 10.45 a.m.; (b) Brookside, Wesley Road; 5 ♀♀ and 6 ♂♂, with 6 *Anopheles maculipennis* and 2 Culicines, obtained in 5 mins.; 1.0 p.m.; both on 12, ix, 1917; fine weather; cool temperature; obs. A. J. Grove.  
 564. **Badshot Lea,** N.E. of Farnham. (a) Fitzroy Farm; cow-shed; 3 ♀♀, with 12 Culicines, obtained in 10 mins.; 10.45 a.m.;

(b) Robbin's Farm; S.W. side of cow-shed; 3 ♀♀, with 5 ♀♀ *Anopheles maculipennis* and 10 Culicines, obtained in 15 mins.; 11.45 a.m.; (c) Robbin's Farm; N.E. side of cow-shed; 1 ♀, with 3 ♀♀ *A. maculipennis* and 9 Culicines, obtained in 15 mins.; 12.0 noon; all on 6, ix, 1917; cloudy weather; warm temperature; obs. A. J. Grove. *L. G. B.*

565. **Shalford**, S. of Guildford. 1 ♀; coll'd. by Capt. A. Parsons, R.A.M.C.; det. W. D. L.
566. **Richmond**. (1) At 50–100 ft. (a) A few larvae in one (middle pond) of the Pen Ponds in Richmond Park; absent in the upper pond, though conditions are similar; margins mossy; short rushes; (b) Larvae fairly numerous in a similar pond in park near Ham Gate; (c) many pupae and a few larvae in a little grass-bordered stream near Roehampton Gate (imagines raised); obs. L. Cobbett; 18, ix, 1900. *N. 1901.* (2) *T's. MS.*
567. **Witley**, S.W. of Godalming. Royal Ponds; 1 ♀; rec. 25, x, 1917; coll'd. O. H. Latter; det. W. D. L. *P. S.*

#### SUSSEX.

568. **Angmering**, S.E. of Arundel. Angmering Ponds; 1 ♂; 4, vii, 1907; coll'd. Rev. A. E. Eaton. *British Museum Collection.*
569. **Arundel**. Arundel Castle; 1 ♂; 11, ix, 1907; coll'd. Rev. A. E. Eaton. *British Museum Collection.*
570. **Barcombe**, N. of Lewes. (1) At 100 ft. or less; 21, vi; obs. Verrall. *N. 1901.* (2) *T's. MS.* (3) Obs. G. H. Verrall; see J. H. Jenner and Rev. E. N. Bloomfield, 1905, *The Victoria History of the Counties of England: Sussex*, vol. i, p. 213. *H. S.*
571. **Bodiam** (Bodyham), N.W. of Rye. Common in the 'eighties; larvae in moat of castle; ii, 1890. *T's. MS.*
572. **Bognor**. Some years, up to 1910, but not visited lately. *T's. MS.*
573. **Coleman's Hatch**, S.W. of Hartfield, S.E. of East Grinstead. "Bad—quite a pest." *T's. MS.*
574. **Hastings**. A few every time I have stayed there; larvae also. *T's. MS.*
575. **Midhurst**. Near Midhurst; ♂♂ swarming; obs. R. F. L. Burton. *A. J. G. L. G. B.*
576. **Plashet**, N.E. of Lewes. (1) Plashet Woods; at 500 ft.; 3, vii; obs. Verrall. *N. 1901.* (2) *T's. MS.* (3) See J. H. A. Jenner and Rev. E. N. Bloomfield, 1905, *The Victoria History of the Counties of England: Sussex*, vol. i, p. 213; obs. G. H. Verrall. *H. S.*
577. **Polegate**. vii, 1886. *T's. MS.*
578. **Rudgwick**, N.W. of Horsham. vi, 1911, and on other occasions; indoors. *T's. MS.*
579. **Worthing**. Country behind Worthing; some years, up to 1910, but not visited lately. *T's. MS.*

#### WARWICKSHIRE.

580. **Sutton Coldfield**. (1) At 300–400 ft.; in a park of 2000 acres, with several streams, pools, and boggy ground; nine species of Culicidae, including *Anopheles*; *A. bifurcatus* not uncommon in collector's garden near small pools in v, vi, viii–x, 1891, 1894, and 1897; obs. Bradley. *N. 1901.* (2) *T's. MS.*



WORCESTERSHIRE.

581. **Stourport.** vii, 1909; and viii, 1907. *T's. MS.*

YORKSHIRE.

582. **Aysgarth.** (1) At 600 ft.; larvae absent in vi and vii (water cold), present in numbers in ix (water warmer), in little spring-fed pools, overhung with vegetation, in rocky river-bed, between bridge and middle fall on N. side of R. Ure; 9, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
583. **Filey.** (1) At 100–200 ft.; larvae, with *Culex*-larvae in a pond half-way down a mud cliff, 1 m. S.E. of Filey; 28, viii, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
584. **Hertford, W. of Filey.** (1) Hertford River marsh; at 90 ft.; many larvae in one flowing ditch, few in another; more in grassy puddles by chalk stream; 4, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
585. **Muston, S.W. of Filey.** (1) On road to Filey; at 150 ft.; larvae in a horse-pond with grassy margin; imagines raised in laboratory; 3, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
586. **Scarborough.** ♀; det. F. W. Edwards; Cambridge University Museum Collection. *H. S.*

WALES.

587. **Conway, Carnarvonshire.** At 50 ft. or less; larvae; iv, 1901; obs. C. W. Daniels. *N. 1905.*
588. **Dolgarrog, S. of Conway, Carnarvonshire.** 1 ♀; 14, vii, 1914; coll. F. W. Edwards. *British Museum Collection.*

SCOTLAND.

- Bonhill, N. of Dumbarton.** 25, vi, 1906; and 1, vii, 1907; obs. J. R. Malloch; per P. H. Grimshaw; in Royal Scottish Museum. *H. S.*
- Davidson's Mains, N.W. of Edinburgh.** 29, v, 1913; ♂♂ and ♀♀ in great abundance at an old marl-pit; W. Evans coll. and det.; det. conf. Dr. J. H. Ashworth, F.R.S. *H. S.*
- Kirkhill, W. of Inverness.** A few larvae in an iron cauldron; 4, ix, 1911; reared to imago stage; coll. and det. Dr. J. W. W. Stephens, Liverpool School of Tropical Medicine; per G. H. F. Nuttall, in correspondence with Dr. Stephens. *H. S.*
- Nethy Bridge, S.W. of Grantown, Inverness-shire.** (1) At about 700 ft.; 1 ♀, 22, vi, 1900; and 2 ♂♂, 24, vi, 1900; on damp, swampy ground; 2 ♀♀, 15, vi, 1900, and 9, vii, 1900, on windows of hotel verandah; obs. Yerbury. *N. 1901.* (2) 1 ♂; 7, vii, 1906; obs. J. J. F. X. King. *H. S.*
- Possil Marsh, N. of Glasgow.** (1) At 100 ft.; several ♂♂ and ♀♀; 7, ix, 1875; coll. Binnie; det. Theobald. *N. 1901.* (2) 2 ♀♀; 29, v, 1903; obs. J. J. F. X. King. *H. S.*
- The Mound, N.W. of Dornoch, Sutherlandshire.** At sea-level; 1 ♀; 8, viii, 1900; and 2 ♂♂; 4, viii, and 10, viii, 1900; on damp, swampy ground; obs. Yerbury. *N. 1901.*
- Torphins, Aberdeenshire, W. of Aberdeen and N.E. of Aboyne.** See note under *Anopheles maculipennis*, Scotland, Torphins.

## IRELAND.

- Clonbrock**, N.W. of Ahascragh, N.W. of Ballinasloe, Co. Galway. 1 ♂; in outhouse; 7, v, 1901; obs. G. H. F. Nuttall. *N. 1905*.
- Courtmacsherry**, S.W. of Kinsale, Co. Cork. iv and v, 1901; G. H. Verrall det.; see C. Donovan, 1901, *British Medical Journal*, vol. ii, p. 14. *H. S.*
- Holywood**, Co. Down, N.E. of Belfast. At 200 ft. or less; obs. A. H. Haliday; see *Ent. Mag.*, 1833, vol. i, p. 148. *N. 1901*.
- Westport**, Co. Mayo. 1 ♀ at river-side; see P. H. Grimshaw, 1912, *Proc. Roy. Irish Acad.*, vol. xxxi, part 25, p. 9. *H. S.*

ANOPHELES PLUMBEUS Stephens (= NIGRIPES  
Staeger).

Numbers on the map referring to this species are within black triangles.

## BUCKINGHAMSHIRE.

589. **Burnham Beeches**, N.W. of Slough. (1, a) 4 ♂♂ and 3 ♀♀ bred from larvae; iv, 1916, v, 1916, 10, ix, 1916; coll'd. F. W. Edwards; (b) 1 ♀; 10, vi, 1909; coll'd. C. O. Waterhouse. *British Museum Collection*. (2) Larvae found in April in holes in beech trees, associated with those of *Ochlerotatus geniculatus*; see F. W. Edwards, 1917, *Bull. Ent. Research*, vol. vii, p. 201. *H. S.*

## CAMBRIDGESHIRE.

590. **Cambridge**. (1) ♀, from garden, 25, ix, 1913; ♀, 23, viii, 1906; ♀, in house, 8, ix, 1912; all coll'd. F. J. H. Jenkinson, M.A., and det. conf. F. W. Edwards; in Cambridge University Museum Collection. *H. S.* (2) Cambridge and immediate vicinity; Mr. F. J. H. Jenkinson gets all three species of *Anopheles* in his garden, but considers *A. plumbeus* very rare there. His garden is near the Upper River. But on 3, ix, 1917, he was staying at a house on the Huntingdon Road, on the top of a rise, with no water except in rain-barrels, but with many large trees near at hand; and he was constantly attacked in the house between 6.0 p.m. and 8.0 p.m. by gnats, and four of those he caught were *A. plumbeus*. *H. S.*

## CHESHIRE.

591. **Poynton**, S. of Stockport. In bedroom; 28, vii, 1916, and 7, viii, 1916; coll'd. Mr. Greenwell; det. Mr. H. L. F. Guérmonprez, of Bognor; information from Mr. Herbert Bury, of High Lane, Cheshire. *H. S.*

## CORNWALL.

592. **Penzance**. (1) 3 ♀♀; 18, ix, 1902. *British Museum Collection*. (2) At 200 ft. or less; 1900; obs. Theobald. *N. 1901*. (3) *T's. MS.* (4) Recorded in *T. 1901*, p. 202.

## DERBYSHIRE.

593. **Bakewell**. *T's. MS.*

DEVONSHIRE.

594. **Sidmouth.** *T's. MS.*  
 595. **Ugbrooke**, S.W. of Exeter. (1) At 300 ft. or less; 20, viii; coll'd. Verrall. *N. 1901.* (2) *T's. MS.* (3) Ugbrooke Park, 30, viii; obs. J. E. Collin (information from Verrall Collection). *H. S.*

ESSEX.

596. **Epping Forest.** [Larva] in root-holes of trees; obs. A. Bacot. *A. J. G. L. G. B.*  
 597. **Rochford.** 1 ♀; 2, vi, 1907; coll'd. Rev. A. E. Eaton. *British Museum Collection.*

HAMPSHIRE.

598. **Lyndhurst.** (1) At 150 ft. or less; comparatively rare; 10, vi, to 20, viii; obs. Verrall; *N. 1901.* (2) *T's. MS.* (3) 14, viii; 17, vii; and 10, ix; per J. E. Collin (from Verrall Collection). *H. S.*  
 599. **New Forest.** ♀; ix, 1904; coll'd. Dr. David Sharp; det. conf. F. W. Edwards. Cambridge University Museum Collection. *H. S.*

HERTFORDSHIRE.

600. **Bushey Heath.** 1 ♀; 27, vii, 1912; coll'd. F. W. Edwards. *British Museum Collection.*  
 601. **Cassiobury Park**, N. of Watford. Young larvae in hole at base of a beech tree, associated with larvae of *Ochlerotatus geniculatus*; 21, viii; [cf. 589 Burnham Beeches]; see F. W. Edwards, 1917, Bull. Ent. Research, vol. vii, p. 201. *H. S.*  
 602. **Hitchin.** (1) 1 ♂; 22, vi, 1915; coll'd. F. W. Edwards. *British Museum Collection.* (2, a) ♂; Oughton Head; vii, 1916; (b) ♂; in greenhouse; ix, 1917; both obs. F. W. Edwards. *A. J. G. L. G. B.*  
 603. **Radwell**, N. of Letchworth. ♂ and ♀; vi, 1917; obs. F. W. Edwards. *A. J. G. L. G. B.*

KENT.

604. **Wye**, N.E. of Ashford. At 150 ft. or less; rare, only one imago taken; 1898; obs. Theobald. *N. 1901.*

LANCASHIRE.

605. **Liverpool** district. See under *Anopheles bijurcatus*, Lancs. 530 Liverpool district.  
 606. **Manchester.** (1) *T's. MS.* (2) *T. 1910*, p. 13.

MIDDLESEX.

607. **Acton.** 1 ♀; 10, vi, 1900; coll'd. C. O. Waterhouse. *British Museum Collection.*

NORTHAMPTONSHIRE.

608. **Lamport**, N. of Northampton. ♀; 7, vii, 1905; coll'd. F. J. H. Jenkinson; det. conf. F. W. Edwards; Cambridge University Museum Collection. *H. S.*



## OXFORDSHIRE.

609. **Oxford.** ♂♂ and ♀♀; vi, vii, viii and ix; bites viciously from late afternoon until sunset; abundant; does not occur in houses, but in damp, marshy spots in and around the city; from a report received, ix, 1917, from A. H. Hamm, the result of observations made during the last three years. *H. S.*

## SHROPSHIRE.

610. **Attingham Park**, S.E. of Shrewsbury. Near Tern River; biting; obs. R. F. L. Burton. *A. J. G. L. G. B.*
611. **Longner Hall**, S.E. of Shrewsbury. (1) 2 ♂♂ and 3 ♀♀; in garden; 16, vi, 1908; coll'd. R. F. L. Burton. *British Museum Collection.* (2) The rarest here of the three species, but by no means rare. It bites all day and night. I have never seen more than two trying to bite at the same time. It is found mostly in woods (from 11, v, to 9, x), but will come into houses to bite more often than will *A. bifurcatus* [cf. 590 Cambridge and 609 Oxford]. Box-trees, yew-trees and ivy are very useful outdoor shelters. I have never seen the ♀ hibernate. The ♂♂ swarm four or five at a time, always at particular spots (indicated below), on any windless, warm evenings between the dates given. There are particular spots in my hayfield where they swarm before the hay is cut.
- 11, v, 1912; 4 ♂♂; swarming near moat, at 6.45 p.m.  
 16, v, 1911; 6 ♂♂; " " " at 7.0 p.m.  
 26, v, 1911; 12 ♂♂; " in Severn Meadows, at 8.15 p.m.  
 30, v, 1908; ♀; above quarry in wood.  
 1, vi, 1908; ♀; in rookery.  
 1, vi, 1908; ♂; sheltering in room of pit latrine.  
 2, vi, 1908; ♂♂; swarming near oak tree in hayfield.  
 2, vi, 1910; ♂♂; " in Severn Meadows, at 8.30 p.m.  
 3, vi, 1908; ♂ and ♀; sheltering in Moat Wood latrine.  
 3, vi, 1910; ♀; biting in rookery.  
 8, vi, 1910; ♂♂; swarming in Severn Meadows, at 8.30 p.m.  
 10, vi, 1910; ♂♂; " at rookery gate, at 8.0 p.m.  
 12, vi, 1908; ♀♀; in rookery and Old Garden.  
 12, vi, 1909; ♂♂; swarming at rookery gate.  
 12, vi, 1910; 10 ♂♂; " in garden, at 8.0 p.m.  
 15, vi, 1910; 25 ♂♂; " near moat, at 7.30 p.m.  
 16, vi, 1908; ♂♂; " in hayfield.  
 19, vi, 1910; ♂♂; " in garden, at 7.15 p.m.  
 20, vi, 1910; ♂♂; " in Severn Meadows, at 8.30 p.m.  
 22, vi, 1908; ♂♂; " in rookery and barn field.  
 29, vi, 1906; ♀♀; in Moat Wood and quarry.  
 3, vii, 1908; ♀; in Moat Wood.  
 4, vii, 1910; ♂♂; swarming in Severn Meadows, at 8.45 p.m.  
 7, vii, 1906; ♂; sheltering in room of latrine.  
 12, vii, 1910; ♂♂; swarming in Severn Meadows, at 8.40 p.m.  
 20, vii, 1906; ♀; in quarry.  
 21, vii, 1906; ♂; sheltering in yew tree in Moat Wood plantation.  
 23, vii, 1910; ♂♂; swarming in Severn Meadows, at 8.20 p.m.  
 28, vii, 1906; ♂; in Moat Wood.  
 28, vii, 1910; ♂; feeding from bloom of *Ligustrum vulgare*, at 6.15 p.m.  
 29, vii, 1906; ♂; in box bush in Old Garden.  
 1, viii, 1906; ♂; sheltering on playhouse roof.  
 7, viii, 1906; ♂♂; swarming near moat, at 7.25 p.m.

- 15, viii, 1910; ♂ ♂; swarming near moat, at 7.30 p.m.  
 22, viii, 1910; ♂ ♂; " " " at 7.15 p.m.  
 27, viii, 1909; ♂; at end of sandy lane, at 7.0 p.m.  
 30, viii, 1909; ♀; biting in withy-bed.  
 31, viii, 1910; ♂ ♂; swarming near moat, at 7.0 p.m.  
 1, ix, 1910; 10 ♂ ♂; " " at 6.15 p.m.  
 4, ix, 1910; 12 ♂ ♂; " " at 5.55 p.m.  
 9, ix, 1910; 8 ♂ ♂; " " at 6.0 p.m.  
 15, ix, 1907; ♀; in Moat Wood plantation.  
 16, ix, 1907; ♀ ♀; biting in dining-room and by moat.  
 18, ix, 1907; ♀; biting in quarry.  
 18, ix, 1910; ♂ ♂; swarming near moat, at 6.0 p.m.  
 22, ix, 1907; ♀; biting in Raven's Nest Wood, at 3.30 p.m.  
 24, ix, 1907; ♂; in rookery.  
 24, ix, 1910; ♂ ♂; swarming near moat, at 5.45 p.m.  
 26, ix, 1907; ♀; biting in Raven's Nest Wood.  
 28, ix, 1917; 1 ♂; buzzing round the garden, looking for ♀.  
 30, ix, 1910; 5 ♂ ♂; swarming near the moat; 5.15 p.m.  
 1, x, 1908; ♀; sheltering in study window.  
 2, x, 1917; 1 ♀; looking for a ♂; 5.30 p.m.; dark, warm night.  
 5, x, 1910; ♂ ♂; swarming near moat, at 5.30 p.m.  
 8, x, 1910; ♂ ♂; " " at 4.45 p.m.  
 9, x, 1910; ♂ ♂; " " at 4.30 p.m.

Notes by R. L. F. Burton, Esq., of Longner Hall, Shrewsbury, many of which are published in *T.*, 1910, p. 13, others from MS. notes in the *British Museum*, others sent to A. J. Grove, Esq., of the *L. G. B.*

612. **Shrewsbury.** (1) On many occasions in and near the town. *T's MS.*  
 (2) *T.* 1910, p. 13.

#### STAFFORDSHIRE.

613. **Wood Eaton Manor**, S.W. of Stafford. Biting; obs. R. F. L. Burton. *A. J. G. L. G. B.*

#### SUFFOLK.

614. **Butley**, S.W. of Aldeburgh. From "The Thicks," a very ancient wood, containing many hollow trees; 4 ♀ ♀; biting viciously; viii, 1909; coll'd. Hugh Scott; det. F. W. Edwards; Cambridge University Museum Collection. *H. S.*  
 615. **Newmarket.** 4 and 6, vi; trying to bite, in garden; obs. J. E. Collin. *H. S.*

#### SURREY.

616. **Merton.** (1) 1 ♀; 6, vi, 1899; in bedroom at night; coll'd. F. W. Terry. *British Museum Collection.* (2) 27, v, 1900; and 6, vi, 1899; both coll'd. F. W. Terry; see E. E. Austen, 1902, *The Victoria History of the Counties of England: Surrey*, vol. i, p. 152. *H. S.*

#### WALES.

617. **Beddgelert**, Carnarvonshire. (1) At 200 ft. or less: beaten from a shady garden in front of the Goat Hotel; ix, 1900; obs. Theobald. *N.* 1901. (2) *T's MS.* (3) 1 ♀; coll'd. F. V. Theobald. *British Museum Collection.*

618. **Bettws-y-Coed**, Merionethshire. *T's. MS.*  
 619. **Colwyn Bay**, Denbighshire. 1 ♀; biting; 21, vi, 1909; coll'd. A. O. Walter. *British Museum Collection.*  
 620. **Llangammarch Wells**, Brecknockshire. 1 ♀; 25, viii, 1913; coll'd. Lt.-Col. Yerbury. *British Museum Collection.*

## SCOTLAND.

- Aberdown Woods**, Fifeshire. (1) ♀ ♀ caught on collector's hand; 2, viii, 1909; obs. W. Evans; per G. H. F. Nuttall. *H. S.* (2) Recorded (locality misspelt "Aberdeen Woods"), *T. 1910*, p. 13. (3) Coll'd. Dr. T. Rettie; per Dr. J. H. Ashworth, F.R.S. *H. S.*  
**Blairgowrie**, Perthshire. 4 ♀ ♀; 28, v, 1908; obs. A. E. Carter. *H. S.*  
**Culross**, Perthshire, W. of Dunfermline, Fifeshire. 1 ♀; biting in a kitchen; 3, ix, 1917; obs. Angus Macdonald, Esq., jr.; det. G. A. K. Marshall. *H. S.*  
**Edinburgh**. (1) 5 ♀ ♀; 28-30, vi, 1913; coll'd. Dr. J. H. Ashworth. *British Museum Collection.* (2) Several from a garden in a western suburb; summer, 1909; coll'd. Dr. T. Rettie, per Dr. J. H. Ashworth, F.R.S. *H. S.* (3) From a large garden in the south of the city, within the city boundary; first taken in 1908, and has appeared regularly in the same garden, in the first half of vi, each succeeding year; in 1909 the first specimen, a ♂, was noticed on 1, vi; and from then until 27, vii (when the collector left the city) specimens were taken nearly every day, the total for the period being 57 ♂ ♂ and 133 ♀ ♀, and the greatest catch for any day being 1 ♂ and 55 ♀ ♀ on 26, vi; for the next five or six days they were also very abundant, after which they were fewer; they have not appeared in such numbers in subsequent years; all search for breeding-places failed to locate them, and the collector surmised that they might be above ground-level in the forks of neighbouring trees; obs. Dr. J. H. Ashworth, F.R.S.; some of these specimens (see (1)), are in the British Museum Collection. *H. S.* (4) 1 ♂ and 1 ♀; coll'd. F. V. Theobald. Recorded, *T. 1910*, p. 13; *British Museum Collection.*  
**Fife**. 4 ♀ ♀; 2, vii, 1909; coll'd. W. Evans. *T. 1910*, p. 13.  
**Lasswade**, S. of Edinburgh. (1) Larvae in a weedy pool; ix, 1909; 1 ♂ reared to imago; "Edwards seems a little doubtful about it, as it is apparently the only record of *A. plumbeus* larvae occurring in water on the ground, i.e. not in trees." *H. S.* (2) Also recorded, with the additional information, pupated, 15, x; and fly emerged, 22, x, in *T. 1910*, p. 13.  
**Torphins**, Aberdeenshire, W. of Aberdeen and N.E. of Aboyne. - See under *Anopheles maculipennis*, Scotland, Torphins.

## IRELAND.

- Courtmacsherry**, S.W. of Kinsale, Co. Cork. Probably this species, but not reliably determined; iv and v, 1901; see C. Donovan, M.D., 1901, *British Medical Journal*, vol. ii, p. 14. *H. S.*  
**Harold's Cross**, Co. Dublin. At 150 ft. or less; 1 ♀; ix, 1899; inf. Carpenter; in Science and Art Museum, Dublin. *N. 1901.*  
**Holywood**, Co. Down, N.E. of Belfast. At 200 ft. or less; the author notes "probably a small variety of *A. bifurcatus*"; recorded by A. H. Haliday, 1833, *Ent. Mag.*, vol. i, pp. 148 and 151. *N. 1901.*



## ANOPHELES SP.

Numbers on the map referring to *Anopheles*, species undetermined, are within red rectangles.

### BUCKINGHAMSHIRE.

621. Opposite **Hurley**, Berks. (1) At 90 ft.; very many larvae among floating weed and *Spirogyra*, just below the big weir (little water flowing over weir); 18, ix, 1900; obs. L. Cobbett. N. 1901. (2) T's. MS.

### CAMBRIDGESHIRE.

622. **Clayhithe**, near Waterbeach, N.E. of Cambridge. At 50 ft. or less; (a) many larvae (maximum, 6-10 per "dip") in a fish-pond containing small pike, inch-long roach and dace, and *Ulva*; (b) many larvae (12, or more, per "dip," but irregularly distributed) in dead-water at bend of river; none in ditch alongside of river, though water was apparently suitable; both, 22, viii, 1900; obs. L. Cobbett. N. 1901.
623. **Wicken Fen** and **Wicken Village**, N.E. of Cambridge. (1) Wicken Fen, at 50 ft. or less; very many larvae, with *Culex*-larvae, in a water-logged boat in a ditch with no algae, and a few larvae in the ditch itself; 19, viii, 1900; obs. L. Cobbett. N. 1901. (2) Wicken Fen. T's. MS. (3) Wicken Village, at 50 ft. or less; very many larvae, with countless *Culex*-larvae, in a very dirty, almost dry ditch in the middle of the village; (six rain-water tubs contained *Culex*-larvae only); 19, viii, 1900; obs. L. Cobbett. N. 1901. (4) Wicken Village. T's. MS.

### DERBYSHIRE.

624. **Beauchief Abbey**, S.W. of Sheffield, Yorks. (1) At 400 ft.; inf. Lefroy. N. 1901. (2) T's. MS.

### DEVONSHIRE.

625. **Barnstaple**. At 50 ft. or less; very few larvae in ditch near rail-road; 6, ix, 1900; obs. T. Strangeways-Pigg. N. 1901.

### ESSEX.

626. **Fairmead Bottom**, near Chingford. 9, ix, 1917; obs. Thomas Brooke. A. J. G. L. G. B.
627. **Hornchurch**. (1) At 50-100 ft.; a few larvae in a pond; 19, ix, 1900; obs. T. Strangeways-Pigg. N. 1901. (2) "Horncastle." T's. MS.
628. **Ockendon**, N.W. of Tilbury. (1) At 50-100 ft.; a few larvae in a pond; 19, ix, 1900; obs. T. Strangeways-Pigg. N. 1901. (2) T's. MS.
629. **Rainham**, S. of Romford. (1) At 50 ft. or less; larvae in marsh ditches; 19, ix, 1900; obs. T. Strangeways-Pigg. N. 1901. (2) T's. MS.
630. **Vange**, N.E. of Tilbury. (1) At 50 ft.; larvae plentiful in pond; 18, ix, 1900; obs. T. Strangeways-Pigg. N. 1901. (2) T's. MS.

## HAMPSHIRE.

631. **Aldershot.** (a) Field bordered by Church Road and Brighton Road ; an open pool, probably artificial and of long duration, with bulrushes growing in the middle, weeds all round the margin, and grass growing in the water ; small minnows, dragon-fly larvae, beetles, etc., noticed ; 5 larvae of varying sizes, mostly where the grass was growing in the water ; (b) Aldershot Park ; at N.E. end of a natural fish-pond shaded by trees and, with plentiful fine-leaved weed ; 3 large larvae caught ; both 29, viii, 1917 ; dull weather ; cool temperature ; (c) in a field near Ash Road, an artificial gravel-pit, grass-grown, with pools of water in the hollows ; a few larvae, with numerous *Culex*-larvae ; 31, viii, 1917 ; fine weather ; cool temperature ; obs. A. J. Grove. *L. G. B.*

## HERTFORDSHIRE.

632. **Broxbourne.** (1) At 100 ft. or less ; larvae in backwater of R. Lea, near railway station ; 5, viii, 1900 ; obs. W. Mitchell. *N. 1901.*  
(2) *T's. MS.*
633. **Rye House**, N.E. of Broxbourne. (1) At 100 ft. or less ; one larva from ditch near toll-house ; 5, viii, 1900 ; obs. W. Mitchell. *N. 1901.*  
(2) *T's. MS.*
634. **St. Albans.** *T's. MS.*

## KENT.

635. **Lydd**, S.W. of Hythe. (1) An artificial, open ditch, full of rushes ; 1 larva ; 21, ix, 1917 ; fine weather ; cool temperature ; obs. A. J. Grove. *L. G. B.* (2) Tourney Hall ; bedroom ; 1 ♂ seen, with *Culicines* ; 10.30 a.m. ; 5, x, 1917 ; obs. A. J. Grove. *L. G. B.*
636. **New Romney**, S.W. of Hythe. (a) Gordon Villas to Spitalfield Lane ; an artificial, open, reed- and rush-grown ditch with numerous insect-larvae ; a few scattered larvae ; (b) Spitalfield Lane ; a similar ditch on the right side of the lane ; numerous larvae ; (c) Spitalfield Lane ; a larger, open ditch on left side, full of water-plants ; very few, scattered larvae ; (d) Church Lane ; an artificial, open, grass- and weed-grown ditch along the side of the road ; scattered larvae ; (e) New Allotment ; a probably artificial, open, reed- and rush-grown pool ; numerous larvae, with *Culex*-larvae ; all 20, ix, 1917 ; fine, sunshiny weather ; cool temperature ; obs. A. J. Grove. *L. G. B.*
637. **Sandwich.** (a) Field between railway and Judd's Ditch ; an open, probably artificial pool, full of reeds, rushes and grass ; numerous larvae, with *Culex*-larvae ; (b) a field near E. Lawrence's cow-shed ; a similar ditch ; numerous larvae (as many as 10 in a single "dip") ; nearly all very young ; (c) southern side of Canterbury Gate, a similar ditch ; numerous larvae ; all on 29, ix, 1917 ; fine weather ; warm temperature ; obs. A. J. Grove. *L. G. B.*
638. **Sheerness** district. Inf. Lt.-Col. S. P. James, I.M.S. *A. J. G. L. G. B.*

## LANCASHIRE.

639. **Car Ho.**, S.W. of Preston. (1) At 50 ft. or less ; a very few larvae in cattle-pond ; 10, ix, 1900 ; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*

LINCOLNSHIRE.

640. **Boston.** (1) Near sea-level: (a) a few small larvae in dirty water, with algae, in Maud Foster Canal, Horncastle Road; (b) a few small larvae in Forty-five-foot Canal; 13, viii, 1900; obs. G. H. F. Nuttall. *N.* 1901. (2) *T's. MS.*

MONMOUTHSHIRE.

641. **Magor**, S.W. of Chepstow. [Applies also to 642 **Redwick.**] Flat country near Magor and Redwick; near sea-level; larvae; ix, 1901; (well known that much malaria was thereabouts about 1860-1870; no cases now, as far as could be ascertained); inf. J. Cropper. *N.* 1905.
642. **Redwick**, S.W. of Chepstow. See under 641 Magor.

NORTHUMBERLAND.

643. **Newcastle.** In train; 7, ix, 1909. *T's. MS.*

NOTTINGHAMSHIRE.

644. **Nottingham.** ♀ ♀ in house in town; vii, 1904. *T's. MS.*

OXFORDSHIRE.

645. **Cleeve**, N. of Goring. At 115 ft.; a few larvae in a flowing ditch, with rushes and flags, communicating with the river; 15, ix, 1900; obs. L. Cobbett. *N.* 1901.
646. **Culham**, S.E. of Abingdon. (1) At 150 ft.; *Anopheles*- and *Culex*-larvae plentiful in grassy, horse-trodden ditch; and 1 *Anopheles*-larva in a lock-out; 13, ix, 1900; obs. L. Cobbett. *N.* 1901. (2) *T's. MS.*

SHROPSHIRE.

647. **Llanyblodwell**, S.W. of Oswestry. Aber-Tanat Hall; cow-shed: 3 ♂ ♂ and 11 ♀ ♀ obtained in 2 mins.; 3.30 p.m.; 19, x, 1917; fine weather; cold temperature; obs. A. J. Grove. *L. G. B.*
648. **Longner Hall**, S.E. of Shrewsbury. (a) An open ditch, probably artificial, reed- and rush-grown, and containing fishes; scattered, not very numerous larvae; (b) an open, artificial pool in a field, with rushes in centre and water-weeds all round the margin; 1 larva in a hole filled with water at the margin of the pool; both 10, ix, 1917; showery general weather, with heavy rain two days before; cold temperature; obs. A. J. Grove. *L. G. B.*

SURREY.

649. **Abrook Common.** Inf. Lt.-Col. James, I.M.S. *A. J. G. L. G. B.*
650. **Ash Vale**, E. of Aldershot, Hants. (1, a) Little Michett Pond, Basingstoke Canal; a large, open, reed- and rush-grown, marshy, probably natural pool; larvae found sporadically, singly or in pairs, along E. side of pool, among grass, etc., growing in the water; (b) Basingstoke Canal, from Ash Vale Canal Bridge to Great Bottom Flash; a slowly-flowing stream, with grassy banks and rushes and water-weeds growing at intervals; larvae, singly or in pairs, at



intervals along the bank; note:—on the canal, between Great Bottom Flash and Michett Lake, and along the S.E. shore of the lake, where conditions appeared to be very similar, no larvae were found; (c) Stratford's Farm; a natural rush- and reed-grown pool, with many dragon-fly and beetle larvae; one larva only at S.E. corner of pool, though conditions in other parts appeared suitable for *Anopheles*, and *Culex*-larvae were plentiful there; (d) Blackwater Bridge, near North Camp Station on the S.E. Ry.; a natural marsh in a meadow alongside R. Blackwater, rush- and reed-grown, with grass growing in the water; 2 larvae, with many *Culex*-larvae; no larvae found in the river; all on 11, ix, 1917; fine, sunshiny weather; hot temperature; obs. A. J. Grove. *L. G. B.* (2) Garden of Duke of Cambridge's house; a ditch, probably artificial, reed- and rush-grown, and partly covered with *Lemna*; larvae very numerous, also *Culex*-larvae; 12, ix, 1917; fine weather; cool temperature; obs. A. J. Grove. *L. G. B.*

651. **Badshot Lea**, N.E. of Farnham. (1) Robbin's Farm; a natural, open pool, partly covered with *Lemna*, with one corner shallow, and grass growing in the water, and with small fishes present; larvae and pupae; 6, ix, 1917; cloudy weather; warm temperature; obs. A. J. Grove. *L. G. B.* (2, a) At back of vicarage; an open, probably natural, rush-grown pool, with grass growing in the water, and with one corner very shallow; larvae and pupae; 7, ix, 1917; dull, but fair weather; warm temperature; (b) the same pool, very much overgrown with grass; larvae scattered; 28, xi, 1917; fine weather; cold temperature; both obs. A. J. Grove. (3, a) Fitzroy Farm; in meadow; an open, probably natural, rush-grown pool, with flowering weeds growing in the water; larvae, with *Culex*-larvae; 6, ix, 1917; cloudy weather; warm temperature; (b) the same pool; the weeds and rushes had now died down, but grass was growing in the water; larvae numerous; 28, xi, 1917; fine weather; cold temperature; obs. A. J. Grove. *L. G. B.*
652. **Esher**. (1) At 48 ft.; larvae in R. Mole; 18, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's MS.*
653. **Farnham**. (1) Field by Darvell's Lane; a shallow, probably artificial, ditch, opening from a shallow pool, with grass growing in the water; larvae, with abundant *Culex*-larvae; 5, ix, 1917; fine weather; warm temperature; obs. A. J. Grove. *L. G. B.* (2) Field near East Road; a probably natural ditch, overgrown with reeds, between the road and river, and opposite a school; (a) numerous larvae, with *Culex*-larvae; 5, ix, 1917; fine weather, warm temperature; (b) the same ditch, now partly dried up and filled with dead vegetation; numerous larvae in a particular spot; 28, xi, 1917; fine weather; cold temperature; obs. A. J. Grove. *L. G. B.*
654. **Hale**, N. of Farnham. (1) In the grounds of Hale Place; a natural, open pool, with *Spirogyra* along the margins; larvae; 7, ix, 1917; cloudy weather; warm temperature; obs. A. J. Grove. *L. G. B.* (2) Hale Place Farm; cow-shed; (a) 2 *Anopheles* seen, but not captured, with numerous Culicines; 12.15 p.m.; 7, ix, 1917; cloudy weather, warm temperature; (b) 1 ♀ obtained in 5 mins.; 12.15 p.m.; 28, xi, 1917; fine weather; cold temperature; both obs. A. J. Grove. *L. G. B.* (3) Baker's Farm; in disused brick-field; an artificial, open, reedy and rush-grown pool with shallow places at the ends, where grass grew in the water; (a) numerous larvae, with some *Culex*-larvae; 13, ix, 1917; cloudy and showery weather; cold temperature; (b) numerous larvae; 29, xi, 1917; fine weather; cold temperature; both obs. A. J. Grove. *L. G. B.*

655. **Heath End**, N. of Farnham. In grounds of White House; a natural, rush-grown, open pool, with grass along the margins and dipping into the water; (a) larvae, with *Culex*-larvae; 7, ix, 1917; fine weather; cold temperature; (b) scattered larvae; 29, xi, 1917; fine weather; cold temperature; both obs. A. J. Grove. *L. G. B.*
656. **Mitcham Common**. (1) 5 larvae, with *Corsetha*- and *Chironomus*-larvae, in a sedgy pool behind the monument on the road between Croydon and Mitcham; 26, ix, 1917; det. Prof. Lefroy; (2) 8 larvae from the next pool in the same place; x, 1917; subsequent weekly visits all through x and xi failed to produce any larvae; both obs. Miss L. E. Cheesman. *A. J. G. L. G. B.*
657. **Wimbledon Common**. 3 larvae in a ditch bordering the high-road on Wimbledon Common; 15, ix, 1917; obs. Miss L. E. Cheesman. *A. J. G. L. G. B.*

SUSSEX.

658. **Seaford**. (1) At 50 ft. or less; inf. Lefroy; *N. 1901.* (2) *T's. MS.*

YORKSHIRE.

659. **Baldersby**, S. of Northallerton. (1) At 100 ft.; larvae in grassy horse-pond; 8, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
660. **Cayton**, S. of Scarborough. (1) On Cayton-Seamer road; at 110 ft.; larvae in a little, grassy roadside pond; viii, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
661. **Gristhorpe Bay**, N. of Filey. (1) At 50 ft.; larvae, with *Culex*-larvae, in cliff-pond with grassy margins; 1, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
662. **Howden**, W. of Hull. (1) At 50 ft. or less; a fair number of larvae (one or two per "dip") in slowly-flowing ditch, with duckweed, 1 m. W. of Howden, on the road to Henningborough; 11, viii, 1900; obs. G. H. F. Nuttall. *N. 1901.* (2) *T's. MS.*
663. **Hull**. (1) At 50 ft. or less; larvae (one per five "dips"), with *Culex*-larvae, along the grassy borders of Barmston Drain, at Newland, a rapidly-flowing, broad and deep stream, with clumps of floating green weed and *Spirogyra* along the banks; 12, viii, 1900; obs. G. H. F. Nuttall. *N. 1901.* (2) *T's. MS.*
664. **Jervaulx**, S.W. of Northallerton. (1) At 300-400 ft.; a fair number of larvae in a large fish-pond with grassy margins; 8, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
665. **Luddenden Foot**, W. of Halifax. Larvae of *Anopheles*. *T's. MS.*
666. **Muston**, S.W. of Filey. (1) At 150 ft.; larvae in horse-ponds with grassy margins; 3, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
667. **Robin Hood's Bay**. (1) At 150 ft.; larvae, with *Culex*-larvae, in cliff-pond with grassy margins; 30, viii, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
668. **Sessay**, S.E. of Northallerton. (1) At 50-100 ft.; larvae in grassy horse-pond; 8, ix, 1900; obs. L. Cobbett. *N. 1901.* *T's. MS.*
669. **Speeton**, S.E. of Filey. (1) At 40 ft.; larvae, with *Culex*-larvae, in cliff-pond with grassy margins; 29, viii, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
670. **West Ayton**. (1) At 100 ft.; very many larvae (maximum 12 per "dip") in Old Castle fish-ponds, near R. Derwent, in a pond with grassy borders, overgrown with flags, and with algae present; no larvae in river close by, nor at Forge Valley; 6, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*

671. **Yedingham Abbey**, N.E. of New Malton. (1) At 75 ft.; a fair number of larvae in slowly-flowing water in R. Derwent and a communicating ditch; 4, ix, 1900; obs. L. Cobbett. *N.* 1901. (2) *T's. MS.*

#### SCOTLAND.

**Callander**, Perthshire. Near Callander; coll'd. W. Evans, but broken in transit to G. H. Verrall, and therefore indeterminable. *H. S.*

### TO DISTINGUISH A GNAT (= MOSQUITO) FROM OTHER FLIES.

**A. The imago or fly.** True Gnats, or Mosquitoes, are delicate flies with comparatively *long antennae* (feelers) on which are whorls of hairs; they have a *long proboscis* formed for sucking plant juices and, in the female, for sucking blood. Most of their external surface is *covered with scales*, which even clothe the *veins of the wings*, including the wing margin; thus the wings, when viewed under a lens, appear to be *fringed*. The scales, however, are very readily rubbed off.

**B. The pupa.** Both the larvae and pupae (that is, the immature stages) of the gnat *live under water*. The pupa is shaped like a *comma* with a gigantic dot. The dot or head of the comma represents the head and thorax of the pupa, and the tail of the comma the abdomen. At its end the abdomen bears a pair of *paddle-like fins*. The thorax bears a pair of short *breathing-tubes*, which *project from it like ears* and pierce the surface-film under which the pupa normally lies, thus allowing it to breathe the air. When disturbed, the pupa *swims downwards in wriggling jerks*.

**C. The larva.** The larva (including four successive stages occurring between the egg and the pupal stage) is straight, elongate, and somewhat *worm-like*, but the *thorax*, bearing the smaller head, is *considerably wider than the long abdomen*. Like the pupa, it normally lies under the surface-film, on the lower side of which it browses and through which it protrudes its breathing-tubes. When alarmed, it descends from the surface in *wriggling jerks*. The *breathing-tubes* open side by side on the dorsal surface of the *last abdominal segment but one*, and either are nearly flush with the surface of the body, or project a long way from it and are then enclosed in a horny tube, or *siphon*. From underneath the last abdominal segment hangs a *median, rudder-like fin*, composed of tufts of hairs arranged in one plane. On the underside of the anterior part of the head, and in front of the mouth, are two very dense tufts of hairs resembling an exuberant moustache; a smaller median tuft also is present. These *brushes* collect the minute organic particles on which the larva feeds, and hand them on to the mouth parts.

### TO DISTINGUISH A BRITISH ANOPHELINE GNAT FROM A BRITISH CULICINE GNAT.

#### A. The imago.

- (1) The abdomen of *Anopheles*, in both sexes, is naked, except for numerous very fine, outstanding hairs. The abdomen of Culicines, in both sexes, is densely clothed with closely-appressed scales (which, however, are readily rubbed off).



- (2) A small part of the hinder end of the thorax of gnats is separated by a groove from the remainder; and this small posterior strip is called the *scutellum*. In *Anopheles*, in both sexes, the scutellum is narrow, with no decided median posterior projection. In *Culicines*, in both sexes, the scutellum is wider, more or less triangular in shape, owing to a large, median tubercle-like swelling bulging the posterior outline.
- (3) In both sexes, in *Anopheles*, the palps—that is, the bristle-like organs on each side of the proboscis—are about as long as, or longer than, the proboscis. In the female *Culicine* the palps are extremely short. This comparatively easily-seen character readily distinguishes the female *Anopheles*, but not the male.

**B. The pupa.** The differences between the *Anopheline* and *Culicine* pupae are not at all readily appreciated. But where pupae occur, larvae are generally present, and the *Anopheline* larva is readily distinguished from the *Culicine*.

**C. The larva.** The larval *Anopheles* has *no siphon*; the breathing-tubes open side by side in the mid-line of the eighth abdominal segment, and nearly flush with the surface of the segment. The larva lies in a *horizontal position* close under the surface-film, anchored to it by stellate hairs on the third to the seventh abdominal segments. The *Culicine* larva has a *siphon*—that is, its breathing-tubes are enclosed in a sheath that projects backwards like a long, straight horn from the dorsal surface of the eighth abdominal segment. The larva hangs by the siphon from the surface-film, and its body makes an angle of about  $45^{\circ}$  with the surface; the position of the siphon is approximately vertical. The head of an *Anopheles* larva is *narrow* compared with that of a *Culicine*.

## TO DISTINGUISH THE THREE BRITISH SPECIES OF ANOPHELES.

### A. The imago.

#### (1) Obvious characters.

##### a. Wings spotted.

*A. maculipennis* Meigen.

##### b. Wings clear.

1. Larger, paler species; thorax brown, with pale longitudinal markings. *A. bifurcatus* (Linnaeus).

2. Smaller, darker species; thorax almost black, with ashy-grey longitudinal markings.

*A. plumbeus* Stephens (= *A. nigripes* Staeger).

#### (2) Occasionally it happens that a small, dark specimen of *A. bifurcatus* may closely resemble an *A. plumbeus*; *A. maculipennis* occasionally is found without spots; and even *A. bifurcatus* has been found with spotted wings. In doubtful cases, then, the following tests may be used.

a. *A. maculipennis* Meigen. Wing-scales less dense and narrower; hair-like scales that form a median tuft on the anterior part of the thorax very narrow, less densely aggregated, of a straw colour, none, or very few, being truly white; posterior outline of scutellum forming a fairly even curve; but the posterior part of the upper surface of the scutellum is tumid in the middle, forming an ill-defined tubercle that invades the anterior, shelf-like upper surface of the scutellum so as to destroy its flatness. The lateral tubercles of the scutellum small.

b. *A. bifurcatus* (Linnaeus). Wing-scales denser and less narrow; hair-like scales that form a median tuft on the anterior

part of the thorax not so narrow, more densely aggregated, some of a straw colour and some truly white; posterior outline of the scutellum forming a fairly even curve; but it has a slight, ill-defined median tubercle, that invades somewhat the anterior shelf-like upper surface of the scutellum, but does not much impair its flatness. The lateral tubercles are rather prominent.

c. *A. plumbeus* Stephens. Wing-scales denser and rather broad; hair-like scales that form a median tuft on the anterior part of the thorax rather wider, densely aggregated, and all, or nearly all, truly white; posterior outline of the scutellum somewhat impinged upon by the small lateral and median tubercles, so that its curve is flattish or even slightly concave on each side of the median tubercle. The tubercles, however, are small and not swollen, and the anterior part of the upper surface of the scutellum is a more or less flat shelf.

- (3) Characters of the male genitalia. On each of the large "side-pieces" or "claspers" are three main bristle-like hairs. One of these lies on the inner side of the clasper, and the other two are a pair lying towards the base of the ventral surface.

- A. Single bristle near the apical end of the inner side of clasper. One of the paired bristles is double, and its edges are frayed.

*A. bifurcatus* (Linnaeus).

- B. Single bristle near the middle of the inner side of clasper.

1. Paired bristles carried on lobes of the clasper.

*A. maculipennis* Meigen.

2. Paired bristles inserted directly on clasper.

*A. plumbeus* Stephens.

## B. The larva.

Note.—These characters do not hold for the first larval stage.

- A. A row of six plumose hairs runs across the upper surface of the head a little posterior to the antennae.

1. The outer clypeal hair (that lies on the dorsal surface of the head just over the brushes) branched in a complex dendroid manner.

*A. maculipennis* Meigen.

2. The outer clypeal hair simple, or once or twice terminally split.

*A. bifurcatus* (Linnaeus).

- B. No plumose hairs on the dorsal surface of the head.

*A. plumbeus* Stephens.

## BRIEF LIFE-HISTORIES OF ANOPHELES.

### 1. *Anopheles maculipennis* Meigen.

In November, December, and the early part of the year no males of *Anopheles maculipennis* are to be found; nor, as far as is known, are there any larvae or pupae of this species in the ponds and streams.\* All that is evident are the impregnated females, that hide away during the winter in warm situations, such as occupied stables and cow-sheds. As soon as the weather is warm enough, these hibernating females, presumably, come forth and lay their eggs, since the larvae have been found in suitable situations early in May (17, (1)). The eggs are disconnected (not united to form "rafts," as in *Culex*), float on the surface of the water, and are hatched in a few days. There can be no doubt that the conditions of the water in which the larvae can live may vary considerably, since the above records locate them in gently-flowing and in stagnant water, in clear water

\* See, however, record 246 (3).

(Grays, Essex), muddy water (91, 110, 137), fresh water (131), brackish water (137), water with some duckweed (105), with plentiful duckweed (106), with fishes, water-scorpions (Grays, Essex), and even water with a dead chicken (155)—to take the records of one county alone. But, generally speaking, the larvae appear to prefer still to troubled water, shallow to deep, clean to foul, fresh to brackish, open to shady, weedy to clear, and especially water that has overflowed the edges of a meadow, so that grass is growing in the water at the margins. On the other hand, too much surface-weed, such as *Lemna* (35), and too many predaceous companions, such as tadpoles (35), do not suit them. These remarks as to environmental conditions probably apply to the larvae of *Anopheles bifurcatus* as well. The larvae feed by browsing over the underside of the surface-film for minute particles of organic matter that happen to be in the neighbourhood of their head. These particles are swept up by the brushes lying at the anterior end of the head, combed out by an anterior row of hairs on the mandibles, and passed into the mouth.\* The larva has four ecdyses or moults (that is, there are four larval stages or *instars*), and at the fifth moult becomes a pupa. The larval stages are run through in a few weeks, apparently varying in time according to the temperature; and the pupal stage lasts but as many days. Thus eggs laid early in May will produce imagines by the end of the month. Males and females may be looked for by this date. (The earliest record for a male is 26, v, 1911; see 344 (2).)

During the day-time both sexes shelter in buildings, stone quarries (344 (2)), ivy bushes (187), and other suitable places, but on calm evenings issue forth and fly about freely. It is then that the females most frequently bite and the males "swarm" in suitable localities. This swarming of the males has a bionomic significance, and is correlated with the act of pairing. In fact, it may be said to play a similar part in the mating habits of gnats as the "display" of the male does in the mating of birds. It provides the necessary stimulus to raise the organism to the required pitch of vitality, and over-tip the equilibrium imposed by inhibiting factors. The swarming-places of the males appear to be fairly constant in a given locality (344 (2)); doubtless they are determined by the configuration of the ground, the vegetation, etc., and consequent condition of the atmosphere at that spot. Burton (344 (2)) records the swarm as consisting of ten or twelve males, and of varying (no doubt according to atmospheric conditions) from seven or eight feet to eighteen or twenty feet above the ground. The swarms are sometimes mixed with other gnats or gnat-like flies. The males begin to swarm at about sunset, and perform that kind of mazy dance which is familiar to all who have noticed mosquitoes, or, still more commonly, the *Limnobiid* flies, so-called "winter gnats," that swarm in sheltered places on mild days in winter. Observers who have watched a swarm of mosquitoes of a species closely allied to *A. maculipennis* tell us that, sooner or later, from the nearest cover, into the midst of it bounces a female. A regular scuffle ensues, and in a few seconds the female with the male she has secured drops out of the swarm, which then gradually resumes its rhythmic motion, in anticipation of another irruption. Swarming continues throughout the summer until the middle or end of October. (The last record of swarming males is 24, x, 1910, see 344 (2), and males are recorded from Yorkshire as late as 7, xi, 1917, see 446.) After this date the males disappear, and apparently larvae are no longer found. It must be understood that successive generations of larvae have been reared in the ponds and streams all through the summer. The females are found sheltering in warm buildings such as houses and occupied stables, cow-sheds, pig-sties, etc., and remain thus through the winter. They will

\* See Nuttall and Shipley, 1901, *Journal of Hygiene*, vol. i, p. 57.



bite, according to Burton, if warm enough, all the year round, and have been recorded biting a horse in a stable early in the year (250 (3)), and attempting to bite persons in a house 24, iii, 1918 (17 (9)).

## 2. *Anopheles bifurcatus* (Linnaeus.)

Though generally similar to that of *A. maculipennis*, the life-history of *A. bifurcatus* differs in some noteworthy features. As far as is known, *A. maculipennis* tides over the winter by means of impregnated females, which hide away in cow-sheds and similar situations during the cold weather, and, issuing thence in the spring, lay their eggs in suitable stations in fresh waters. *A. bifurcatus*, on the other hand, hibernates as a half-grown larva, which, as soon as the warm weather comes, resumes growth, and before long emerges as an adult fly. Thus, in the new season, *A. bifurcatus* has a start of *A. maculipennis*, in that the larva is already half-grown when that of *A. maculipennis* is in the egg. It is probably owing to this that imagines of *A. bifurcatus* are found earlier in the season than those of *A. maculipennis* (if the hibernating females of the latter species are discounted). Thus the earliest record for a male of *A. bifurcatus* is April 20 (see 550, "♂ ♂ swarming on 20, iv"), while that for *A. maculipennis* is May 26 (344 (2)).\*

A second difference between the habits of the two species is that *A. bifurcatus* generally avoids houses (545, 550) and takes to woods for shelter, while *A. maculipennis* shelters in buildings and quarries; and it is noteworthy, in this connexion, that *A. maculipennis* is recorded as having been beaten from ivy (187), a plant particularly associated with masonry; and *A. bifurcatus* as sheltering in *Mercurialis perennis* (a woodland plant), in heaps of small fallen branches as well as in nettles (550). *A. bifurcatus* occasionally enters houses (494, 506, 578, etc.), and one observer (529) records it as preferring the ground floor, while *A. maculipennis* occurred on the first floor. (The genus *Anopheles* generally has been observed to avoid the upper stories of houses.†) But, as a rule, it is to be found in the neighbourhood of "woods, near ponds, ditches and streams; and it bites men and cattle, day and night" (550).

It is probably its domestic habits that make *A. maculipennis* appear from the records to be far more common than *A. bifurcatus*, and it may be so, as a fact. But their respective habits will doubtless account for *A. bifurcatus* appearing to be less common than it really is. In many localities in Kent Theobald definitely records it as less common than *A. maculipennis* (513-15, 517, 527-9). On the other hand, at Oxford (545) and at Longner Hall, near Shrewsbury (550), *A. bifurcatus* is recorded as the commoner species.‡

Another interesting observation on this species, compared with *A. maculipennis*, is that its numbers in successive years are more constant (550). *A. maculipennis* is notorious for varying in numbers from year to year (17 (8), 344). Perhaps to hibernate as an adult female (the habit of *A. maculipennis*) is more fraught with danger than to spend the winter in the water, like the hibernating larva of *A. bifurcatus*; and mild weather prematurely tempting forth the adult *A. maculipennis*, followed by a return of wintry conditions, might well produce such a mortality as to affect adversely the numbers of *A. maculipennis* in the following season; whereas it is known that the hibernating larvae of *A. bifurcatus* will

\* This year (1918) appears to have been exceptional for the early appearance of *A. bifurcatus*. Lt.-Col. James showed me a "wild" specimen he took in February, and the species was prevalent in March.

† Nuttall, Cobbett, and Strangeways-Pigg, 1901, *Journal of Hygiene*, vol. i, p. 7.

‡ Major Christophers tells me that, in his experience, *A. bifurcatus* is commoner in England than *A. maculipennis*.

withstand icy conditions, since specimens have been procured alive under the ice by Capt. F. W. O'Connor, R.A.M.C., at Lydd, in March of the present year. Evidence is also to hand from Macedonia of *Anopheles*-larvae being able to survive enclosure in ice.

At about the middle of October the imagines of *A. bifurcatus* are no longer found. (The latest record is 21, x; see 550.) It seems that at this time of year no more eggs are laid, and the larvae on becoming about half-grown reach a critical point in their life-history, at which one of two courses are possible. Either their growth proceeds beyond this point, when they must continuously complete their normal development; or growth is checked, and they remain at this stage all the winter, and only resume their development in the spring. Environmental factors, of which temperature is the chief, probably determine which of these two courses are to be taken, and apply the appropriate stimulus at the critical moment when the growth inhibitions are applied or released; and soon the arrested larvae are all that is found of *A. bifurcatus* until the following spring.

In other respects the habits of *A. bifurcatus* appear to resemble those of *A. maculipennis*.

### 3. *Anopheles plumbeus* Stephens (= *nigripes* Staeger).

While *Anopheles maculipennis* may be described as a domestic species, and *A. bifurcatus* as frequenting woods and fields, *A. plumbeus* is essentially a sylvan species, seeing that even its larval stages are passed generally, if not always, in pools formed in the hollows of trees (589, 596, 601; see, however, also a record under Lasswade). In spite of its sylvan habits, *A. plumbeus* will enter houses more readily than will *A. bifurcatus* (590, 591, 611), though one record would suggest the contrary (609), and bites all day and night from April to October. Between October and April neither larvae, pupae, nor adults have been found. It is, therefore, unknown in what state it spends the winter. But the fact that both larvae (589) and flies (616) have been found in April would point to the probability that the species hibernates as a larva. Did only the adult flies hibernate, it is probable that the first records would refer to these alone, since they would necessarily precede in appearance the larvae by a few weeks.

*A. plumbeus* shelters in bushes (box and yew are particularly mentioned (611)), and has often been recorded from gardens (590, 611, 615, 617). It is interesting to note that a male was seen feeding from privet blossom (at 6.15 on the evening of July 28; see 611). The males appear to swarm in smaller companies than those of *A. maculipennis*—that is, four or five instead of ten or twelve to a swarm.

From the few available records it would seem that *A. plumbeus* and *A. bifurcatus* are both commoner in Scotland than *A. maculipennis*; whereas in England *A. plumbeus* is the least common of the three species.

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# BRITISH MUSEUM (NATURAL HISTORY)

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## A MAP SHOWING THE KNOWN DISTRIBUTION IN ENGLAND AND WALES OF THE ANOPHELINE MOSQUITOES, WITH EXPLANA- TORY TEXT AND NOTES.

BY

WILLIAM DICKSON LANG, M.A.

Assistant attached to the  
Department of Entomology.



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